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# USSR Report

MILITARY AFFAIRS

No. 1798

AVIATION AND COSMONAUTICS

No. 6, June 1983

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30 September 1983

# USSR REPORT MILITARY AFFAIRS

No. 1798

## AVIATION AND COSMONAUTICS

No. 6, June 1983

Except where indicated otherwise in the table of contents the following is a complete translation of the Russian-language monthly journal AVIATSIYA I KOSMONAVTIKA published in Moscow.

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## LOGINOV URGES IMPROVED REAR SERVICES PERFORMANCE

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 6, Jun 83 (signed to press 4 May 83) pp 1-3

[Article by Col Gen Avn V. Loginov, deputy commander in chief of the Air Forces for rear services, chief, Air Forces Rear Services: "The Rear Services and Aviator Combat Readiness"]

[Text] Today's Air Forces rear services represent a large-scale military organization provided with sophisticated hardware, airfield complexes, and equipment. It is no easy job to manage this organization, to maintain aviation units at a high level of combat readiness, to service flight operations, and to ensure flight operations safety. This job requires a great deal of energy and effort on the part of the military personnel, civilian workers and employees of rear services units and subunits. Those to whom this job is entrusted endeavor to maintain airfields, warehouses, storage depots, aviation garrison barracks and other housing in exemplary condition. Kitchen-attached food production operations and provision of high-calory meals to aviation personnel require a great deal of work and effort!

The broad range of duties of the various specialists in the complex rear services organization presupposes a high degree of personnel ideological conditioning, a high degree of preparedness, efficiency, organization, and technical ability. This determines first and foremost prompt and timely accomplishment of tasks pertaining to logistic, airfield technical, transport and personnel services support of aviator combat training. Commanders, political workers, staff officers, party and Komsomol organizations of rear services units and subunits are making an effort to ensure that in the course of tactical flight training and in the daily job routine personnel work persistently to improve skills in providing smooth, high-quality support for flight operations and constantly concern themselves with further strengthening the combat readiness of squadrons and regiments.

Air Forces rear services specialists perform particularly complex and critical tasks in the period of intensive flight training. From the very first days socialist competition for excellent quality of combat and political training, precision and flawless flight operations support, day and night, was extensively undertaken in the units and subunits. Commanders and political workers evaluate achieved results in a party-minded and demanding manner and, together

with their subordinates, continuously seek reserve potential for achieving economical utilization of resources. They are endeavoring successfully to accomplish the tasks assigned to the USSR Armed Forces by the 26th CPSU Congress and to carry out subsequent instructions by the party and government. Military collectives have drawn earnest conclusions from the decisions of the November (1982) CPSU Central Committee Plenum, from the points and conclusions contained in the speech by CPSU Central Committee General Secretary Comrade Yu. V. Andropov entitled "60th Anniversary of the USSR," as well as in his article entitled "The Teaching of Karl Marx and Some Aspects of Building Socialism in the USSR."

Constantly improving rear services support and living conditions for military personnel, commanders and political workers constantly bear in mind that this is a matter of great importance, a matter of policy. V. I. Lenin stated: "The very finest army and persons who are the most dedicated to the cause of the revolution will be immediately annihilated by the enemy if they are inadequately armed, provisioned, and trained." The command authorities of Air Forces rear services units and subunits ground their activities on the foundation of these demands.

The number of excellent-rated individuals and proficiency-rated specialists is increasing day by day in the subunits; training facilities are improving, and the capabilities of the subsidiary food raising operations are steadily increasing.

As experience indicates, in those military collectives in which commanders, staffs, party and Komsomol organizations thoughtfully approach organization of the training process, persistently adopt all new and progressive innovations, self-critically and demandingly appraise achieved results, successes are in evidence. Subunits are steadily achieving better smoothness and coordination and personnel are working conscientiously, clearly aware of their great responsibility for high-quality accomplishment of assigned tasks directly linked with improving the air, tactical, and weapon proficiency of our aviators. With this approach to the job more officers, warrant officers, noncommissioned officers and enlisted personnel are mastering related occupational specialties.

Concern about ideological-political conditioning, the professional advancement of personnel, and smoothness of performance in carrying out combat training assignments is taking on great importance today. Wherever these matters are handled in a prompt, timely and efficient manner, there is better teamwork and cooperation between OBATO [Independent Airfield Technical Maintenance Battalion) services and aviation unit headquarters, there is more precise and coordinated flight operations support, airfield and flight line security and personnel service activities are organized according to proper procedures and regulations, and aviation personnel living conditions, rest and recreation are properly handled. And this is of great importance for successful organization of flight operations shifts and for maintaining exemplary order and firm discipline both at the airfield and on the post.

A strong sense of responsibility for maintaining the airfield in a continuous state of readiness and for the specialized equipment characterizes the activities

of the men of the aviation technical unit under the command of Lt Col V. Kraskovskiy. Combat and political training is correctly and smoothly organized in this unit, regulations are faithfully observed and discipline is firm in all services, and every specialist displays a high degree of efficiency and personal responsibility for his assigned job. The slightest deviations from standard military procedures, military regulations and the demands of the military oath bring an immediate, firm response on the part of the commanding officer, his staff, the party and Komsomol organizations.

Paternal solicitude on the part of the commanding officer, his deputies, and other officers for their subordinates, mutual respect, assistance and support foster efficient training and indoctrination of personnel, improved organization of military labor, cohesiveness of the military collective, and maintaining a healthy moral atmosphere in it. The commanding officer, Communists and Komsomol activists skillfully mobilize personnel to maintain in a continuous state of readiness the runways, taxiways, and specialized vehicles, continuously emphasizing the importance of successful accomplishment of this task for high-quality execution of aviation personnel combat training and flight operations safety plan.

In the course of summer training officers seek to utilize more fully the possibilities of socialist competition. They devote earnest attention to the mastery of new equipment, a tireless quest for advanced methods of logistic support of aviation personnel training, and efficient utilization of the various machinery and equipment in the interests of further increasing combat readiness.

Successful accomplishment of these tasks depends on precise planning of training activities, methods skill on the part of officer-instructors, and availability of modern training facilities. In this unit tactical-rear services and special training exercises are held in a situation approximating that in which personnel operate at the airfield and in the course of tactical air exercises. Practice drills are heavily saturated on a regular basis with unexpected, complicated scenario instructions. This helps develop ingenuity in the men, as well as initiative and the ability to make an intelligent decision when the situation suddenly becomes more complex and unswervingly to carry out that decision.

In this unit they have arranged precise coordination between services, vehicles and equipment are employed intelligently and efficiently, and servicing and maintenance procedures are performed at scheduled intervals on the specialized vehicles and equipment. Facilities are repaired in a prompt and timely manner, classrooms, laboratories, and practice areas are upgraded, and mess halls and barracks are provided with services and amenities. Recently the external appearance of the military post has also changed considerably; a great many trees and shrubs have been planted on the compound.

In this leading collective they are also concerned about the technical proficiency of their specialists. Meriting attention in this connection is the experience of the motor transport company under the command of party member Capt L. Smitich. Here every person in charge of a training class or drill must

be able to demonstrate to the men how to perform when things become complicated during flight operations support activities, during a march, and when repelling an enemy attack on the airfield. Officer Smitich, one of the best methods experts and an aggressive innovator, usually conducts classes with platoon commanders himself. Officers V. Biryukov and V. Svetlichnyy, and WO A. Pototskiy have set up a modern motor transport classroom in the subunit. It contains a panoramic display of the airfield, reproducing those road sections and crossroads which are hardest to drive, and with clearly-designated peculiarities of motor vehicle operation. This panoramic display helps military truck drivers improve their knowledge.

As we know, unit and subunit commanders and service officers play a decisive role in training and indoctrinating aviation rear services specialists and in the campaign to achieve continuous combat readiness and high-quality flight operations support activities. Of particular importance is their ability precisely to plan the work activities of their subordinates taking into account climatic and other conditions affecting the operation of airport systems and specialized equipment, and to monitor the work performance of personnel in all areas. To achieve this the officer-leader needs profound knowledge, solid skills, and competence. Unfortunately some service chiefs devote little attention to independent preparation, study of modern equipment, and do not fully utilize the favorable opportunities offered by the summer period of training for increasing the men's combat proficiency.

Training classes and drills must be conducted on a regular basis, taking into account important tasks which are being performed, and on a high methodological and organizational level. And at times of intensive flight operations, it is very important for commanders and staff officers to prepare precise schedules, in order to avoid wasted time in the training and indoctrination process. Every opportunity should be efficiently utilized to improve specialists' job proficiency, particularly competition in performing tasks and meeting performance standards.

We should note that socialist competition plays a very great role in the campaign to increase the combat readiness of aviation squadrons and units, to achieve smooth and efficient performance by all rear services elements, and for excellent quality of the training and indoctrination process. Socialist competition is conducted in the subunits under the slogan "Increase Vigilance, Reliably Guarantee the Security of the Homeland!" And one area of reserve potential for ensuring its effectiveness is to be found in the campaign for careful storage and efficient utilization of the material resources and funds allocated for supporting the training process and keeping aviation personnel continuously combat-ready. It is very important to devote the most earnest attention toward economizing in fuel, motor vehicle operation, electricity, and toward correct maintenance of airfield, buildings and structures.

Tactical air and rear services airfield exercises, especially those involving redeployment to unfamiliar airfields and helicopter operations sites, constitute an excellent school of combat proficiency, for getting rear services subunits to operate smoothly, and for improving their capability efficiently to accomplish the difficult tasks of providing support for air operations in conditions of a

rapidly changing situation. It is essential to continue in the future devoting the most earnest attention to march training of subunits and crews and readying them for operating in conditions maximally approximating actual combat, and this requires executing marches at night and in bad weather and road conditions, working persistently to train personnel to provide march columns with reliable security and antiaircraft defense.

Increased demands on aviation rear services personnel proficiency, in addition to careful planning and employment of new teaching methods, require monitoring the independent study by officers and warrant officers. Individual assignments, combining theoretical study of the subject with practical hands-on training on the equipment and at the work station, are becoming important. In preparing individual assignments it is essential to observe the tried and proven method of "from the simple to the complex," which ensures continuity and sequence in studying scheduled topics.

Seeking to improve organization of training classes and training methods in light of the demands of the USSR minister of defense and the commander in chief of the Air Forces, it is necessary continuously to increase the indoctrinational role of the training process and its active influence on further improving combat readiness, strengthening discipline, and maintaining firm observance of regulations.

It is important to develop in rear services personnel excellent moral-political and fighting qualities, vigilance, and to explain to the men the danger to peace presented by the militarist foreign policy of the present U.S. Administration and governments of other member countries of the aggressive NATO bloc, which have embarked upon an unparalleled escalation of the arms race. A strong feeling of responsibility for the security of the homeland, confidence in their capabilities and actions are reinforced during intensive drills, training classes, and exercises, which reproduce the specific features of the difficult job of aviation rear services personnel in providing flight operations with support services in a situation maximally approximating actual combat.

We should stress that the diversity of the complex and responsible tasks performed by personnel in the summer period should not push into a secondary position work connected with preparations for the fall-winter period. While warm summer weather is with us, aviation rear services specialists must perform an aggregate of measures on the airfield, other structures and facilities. For this reason it is very important to check their condition in a prompt and timely manner, to inspect buildings, boiler rooms, utilities and service lines, to complete repairs on all facilities, and to do an excellent job of readying equipment, equipment parking areas and shelters for winter operations.

Air Forces rear services specialists are also called upon to make a worthy contribution toward implementation of the Food Program formulated at the May (1982) CPSU Central Committee Plenum. Many subsidiary food raising operations of units and subunits, such as those in which officers V. Kraskovskiy and G. Il'in serve, provide considerable quantities of meat, milk, eggs, vegetables, and fruits to the men's table. This is not the situation everywhere, however. The reasons are to be found in inept conduct of subsidiary food raising



operations and inadequate attention to the state of livestock units, greenhouses, and vegetable gardens. A lack of knowledge and experience is also a factor. One of the important and difficult tasks for Air Forces rear services personnel is to work hard to learn how to raise and keep livestock, poultry, fish, and produce good harvests of vegetables, fruits, melons and other crops.

Purposeful, daily party-political work aims at fostering successful accomplishment of all assigned tasks. Commanders, political workers, and party organizations should organize it in a differentiated manner, taking into consideration the specific features of each category of Soviet Army military personnel and civilian employees. Well-reasoned placement of party and Komsomol activists in all areas is essential, as is constant concern for instilling in the men a love of their profession, readiness and willingness to accomplish successful performance of all tasks day and night, in all weather, and in any tactical situation.

"Things should be organized in such a manner," noted USSR Minister of Defense MSU D. F. Ustinov, member of the CPSU Central Committee Politburo, in his speech at the Armed Forces Conference on Improving Personnel Living Conditions, "that in all conditions the men will have a place to get warm if it is cold, a place to take refuge from the heat, a place where they can take meals in a normal manner, where they can decently spend their free time and, if necessary, where they can conduct training activities."

Implementing these instructions by the USSR minister of defense, aviation rear services specialists are working hard to master the operation of high-powered machinery and equipment, oxygen, nitrogen and tank filling stations, ground power and hydraulic sources, new fuel and lubricant tankers, air conditioners, and other equipment in order to achieve a further increase in the combat readiness of our glorious Air Forces.

We are in a period of intensive, strenuous summer combat training. At airfields, gunnery ranges and in classrooms, aviation personnel are working hard to improve their air, weapons and tactical proficiency, to maintain the combat readiness of aviation units and subunits at a proper level. High-quality accomplishment of these complex tasks depends in large measure on the proficiency, initiative and efficiency of Air Forces rear services specialists, whose job it is to provide flight operations support in a precision manner, to maintain airfields in an exemplary state, and to perform on schedule an entire aggregate of measures directed toward further improving housing and living conditions for Air Forces personnel.

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## EFFECTIVE FLIGHT INSTRUCTION TECHNIQUES URGED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 6, Jun 83 (signed to press 4 May 83) pp 4-5

[Article by expert marksman military pilot Lt Col V. Tolcheyev: "The Test... Is the Landing"]

[Text] The bomber crews had successfully accomplished their missions and were returning to base. The leader was the first to land, followed by the others. The heavy aircraft touched down and rolled out, gradually slowing. What pilot can remain indifferent while observing such a sight? It not only attracts one's gaze but also says a great deal to the professional.

Just as a falcon can be judged by its flight, a pilot can be judged by his landing. Landing requires a high degree of professional expertise, which is not so easy to acquire. Each pilot, while rigorously observing the overall procedures, places his own individual stamp on gauging and executing the approach and landing.

...One of the bombers was on final. It passed over the middle marker, smoothly flared, and gently touched down. This was Capt I. Shirshov's aircraft.

But there was a time when Shirshov required a great deal of attention: this pilot was making hard landings. The detachment commander, military pilot 1st class Capt A. Gorislavets, carefully examined the flight recorder data before talking to the officer, evaluating Shirshov's handling of the controls at various points during the final approach, flare, and touchdown. As we know, however, it is not always possible immediately to determine the actual cause of an error, regardless of how simple it ultimately turns out to have been. This was the case on this occasion as well. In the final analysis the commander determined that Shirshov was wrongly distributing his attention and looking toward the ground at the moment of flaring. This was the reason he miscalculated and landed hard.

Supplementary practice sections and drills were set up for Shirshov. He was given check flights. It took a certain amount of time for the pilot solidly to master where he should look and when. His flying improved.



The detachment commander carefully monitored the officer's performance on training flights and did not ignore even the slightest deviation. Performance improved with each mission, and the pilot was performing with increasing confidence on takeoff and landing. There was also a substantial improvement in the aircrew's skill in combat and on long cross-country flights in all conditions. The aircraft commander gained increasing respect from his crew and others. The combat collective became more smoothly-functioning and coordinated.

This example shows how important it is to have the ability thoughtfully to analyze the reasons for various weak spots in the proficiency of air warriors and to find effective ways of correcting them. Unfortunately we sometimes encounter cases where errors are analyzed superficially, and officers do not go beyond scheduling check flights to correct deficiencies. This is nothing but a half-measure, which cannot produce the desired result.

Military pilot 2nd class Capt Yu. Vasin would bring his plane in too low on final approach. He was unable to correct this error, however, although he was given check flights. I was ordered to go up with him as instructor. Neither Vasin nor his commander had told me how he was making his landing approaches. Naturally I should have more closely scrutinized the specific features of this pilot's flying technique in order to find out what mistakes he was making, but I did not do so.

Vasin performed creditably on the training flight. I could not help but wonder why they had asked me to go up and check him out. I finally realized what it was all about as we were landing. The pilot began his flare late, and he pulled back on the controls too slow for the rate at which the aircraft was approaching the ground. I had to grab the controls.

After the flight the command personnel and I thoroughly analyzed all Vasin's landings, talked with him, and devised a method to correct his mistakes. After specific training drills and additional practice in the aircraft cockpit, the pilot no longer made mistakes in his flying.

Both the detachment commander and I drew earnest conclusions from this incident. Since that time, before going up as an instructor with somebody, I thoroughly study his flight history. I believe the reader will agree that without this it is unlikely that a check flight will produce results.

The pilot-instructor's job is important. It requires not only thorough knowledge of airmanship and solid professional skills (without this it is inconceivable to teach others), but also methods skills and the ability to explain the incomprehensible in an easily understood manner. In my opinion the instructor's skill lies in preventing a student's mistakes from progressing further while allowing him independently to correct his mistakes. In one instance it suffices to observe a student's actions without further intervention, while in other instances it is appropriate to prompt the student, to give him practical assistance in piloting or, if necessary, immediately to take over the controls and to perform a difficult maneuver in such a manner that the pilot will long remember it as a model, for this in large measure determines the

instructor's degree of authority, and therefore also the weight of his every word and every piece of advice.

Of course correcting errors in takeoff and landing is not only the business of the instructor. A great deal of assistance can be given here by the flight operations officer and his aides in the control tower. A very important role can be played by their patience and knowledge of the performance capabilities of each aircrew. With slight deviations from standard performance, one should not always immediately intervene in the pilot's actions. Sometimes it suffices to inform him of an error he has made. The main thing is to watch and make sure that it does not become aggravated and particularly that it does not become transformed into a gross error.

Once Capt A. Demidenko made an excessively low approach and began his flare long before reaching the runway threshold. The assistant flight operations officer, military pilot 1st class Capt I. Kovalenko, noted this but did nothing about it. As a result the aircraft touched down short of the runway. In this instance of course not only the pilot is to blame but also the assistant flight operations officer, for he could not help but see how the faulty approach was developing, he knew at what point it could be corrected, but unfortunately he remained a passive observer.

One often hears the statement that the pilot must know how to analyze his own mistakes. The pilot who is taught this as a rule more rapidly achieves appreciable results in his professional advancement.

It is not easy to teach people independently to analyze their actions. It is very important to give every encouragement and to support the endeavor to achieve this by one's subordinates, as is the case, for example, in the squadron under the command of military pilot 1st class Maj V. Eydukaytis. There prevails in this squadron an atmosphere of strong demandingness that regulations be observed, as well as complete trust. Every pilot freely approaches his superior, tells him about difficulties which have arisen, and asks for help. Nobody is embarrassed when it is necessary to request a check flight on a certain maneuver. This is a result of excellent indoctrination work by the commanding officer, his deputies, and party activists. It is not surprising that for a number of years now the subunit has been excellent-rated.

Sometimes the following also happens. An experienced instructor has taught a great many pilots, excellent air warriors and commanders with boundless love for the aviation profession. And suddenly he has a student to whom he cannot seem to find the right approach. Patience, work, and a thoughtful quest for an optimal approach are particularly necessary in such a case.

Capt A. Sidorenko was assigned as an aircraft commander to the squadron under the command of expert marksman military pilot Lt Col S. Kovalenko. Sidorenko had been flying a different type of aircraft. The squadron commander proceeded to train the captain. He expended a great deal of effort, but things were not proceeding well and were even getting worse. The takeoff and landing were particularly difficult for the young pilot to master. He did fine with theory, but with actual flying....

Every pilot in the squadron considered it an honor to go up with Lieutenant Colonel Kovalenko, but the newcomer was unable to cope with the excessive tension it caused him. Taking his place in the cockpit, he would freeze up. He was afraid he would forget to perform some procedure, and even his voice would become dry and strange-sounding. Of course letting him go up alone was out of the question. But time was running short. The squadron commander turned for help to deputy regimental commander Lt Col I. Ladyka.

As Sidorenko was taxiing to the active, Ladyka noted that he was quite tense. He put himself in the pilot's place and imagined what the latter might be feeling and thinking at this moment: since a senior officer is riding with him, things must really be bad. If he fails on this flight, they might wash him out or assign him to an aircraft of a different type. But the deputy regimental commander knew that Sidorenko very much did not want this to happen....

Lieutenant Colonel Ladyka, pretending not to be aware of the pilot's state, asked the navigator a couple of questions, and then asked a quite trivial question of the captain. His calm, trusting tone of voice relaxed the tension. Sidorenko became less tense, and even relaxed more in his seat. The flight, however, did not satisfy the check pilot.

Following a detailed critique, Lieutenant Colonel Ladyka asked the captain to go up with him once again. He emphasized that since it had been a long time since he had flown in the left-hand seat, Sidorenko was to keep a close watch on him and make a detailed analysis after the flight.

Apparently, because he felt a real measure of responsibility and complete independence, the pilot performed the flight assignment fully satisfactorily. He received a mark of good on his next check ride and was approved to fly as pilot in command. Captain Sidorenko is presently perfecting his combat skills.

This example shows how important it is to consider a trainee's psychological state and to know his specific personality and character.

Sometimes the most unusual devices are effective in flight training. I would like to discuss one device in particular. It is the device of artificially introducing an error in the flight by the instructor, for the purpose of demonstrating how such an error arises and how it should be corrected.

Captain V. Martynenko flared his aircraft high, and then pulled the controls too far back. This caused the aircraft to drop hard onto the runway, causing excessive shock and stress. A critique of the flight and theoretical explanations failed to produce the desired results. At this point Lt Col S. Kovalenko, with the permission of the regimental commander, decided to use what was for him an extreme device: during a check flight he introduced an error and, while the aircraft was swiftly plunging groundward, demonstrated how properly to pull back on the control stick. Thus he gave the trainee the opportunity to actually feel forces on the control stick and its manipulation. After this flight the number of errors made by Martynenko on landing decreased appreciably, and soon he began landing the aircraft much more softly.

I want to emphasize that this method requires very cautious application, since it is possible to introduce by inexperience an error which will be difficult to correct. The entire procedure must be thought out very thoroughly in advance. There exists the opinion that such a device should not be used at all. We feel, however, that it will definitely be beneficial if the most experienced instructors are taught this method, with rigorously selective determination of specific maneuvers.

Various errors are encountered in practical flight training. Some are engendered by the individual peculiarities of the pilots, while others are "programmed," as it were. Defects in the flight operations schedule can confirm this. In order to correct them, a memorandum on overseeing preparation of the schedule was prepared and approved at higher headquarters. The memorandum contains more than 50 points. It does not take more than 15 minutes to check a rough draft schedule with it. It is definitely useful.

A list of the specific features of forthcoming flight activities also helps avoid many errors. It focuses the attention of flight personnel on the most critical phases of a flight, proceeding from the actual situation. As a rule this document is used at preflight briefings.

Statistics indicate that the highest percentage of dangerous mistakes take place during takeoff, approach, and landing. Special attention is always focused on these phases in flight training.

At a regimental flying methods conference there was discussion of preparing a manual for flight personnel on methods of correcting errors in piloting techniques in these phases. Many officers stated their opinion on these issues. An appropriate system of rules was drawn up on the basis of the conference discussion. It specified the most typical mistakes and indicated their causes, potential consequences, and ways to prevent and correct them.

Analysis of mistakes in piloting technique can be subdivided into one-time (for example, analysis and critique of just-completed flight operations) and systematic. The former is done immediately, when a pilot's actions and the actual situation in which a mistake was made are still fresh in his mind. The latter is grounded on statistics and repeated observations. Random errors are ignored, and each pilot's most typical errors are identified, which as a rule are deep-rooted, sometimes grounded in the early stage of training or connected with the protracted influence of some factor on the pilot. Piloting technique errors of each pilot are recorded in a special log, and at the squadron level they are consolidated into tables for purposes of clear representation.

Practical experience indicates that this system of analyzing mistakes helps in purposefully striving for excellent quality of flight operations and helps effectively accomplish the task of improving the combat readiness of aircrews and subunits.

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## VETERAN PILOT-INSPECTOR LAUDED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 6, Jun 83 (signed to press 4 May 83) pp 5-6

[Article by Maj Yu. Andronov: "Preeminent"]

[Text] There are people whom you like right from the start, as if you have been friends for years. Such a person is Colonel Bezborodov -- a pilot-inspector in the district's Air Forces combat training department. An experienced expert and a man of ebullient energy, he never turns down a request for help. If somewhere there has occurred a violation of flight regulations, he becomes an investigator, using his profound knowledge of aviation, psychology and education science, and carefully determines the cause of the violation and the degree of guilt on the on the part of aircrew and ground services.

More than 30 years have passed since Bezborodov went up for the first time. He became certified in aircraft of several types and helped train hundreds of pilots who are currently guarding the skies in various parts of our immense country. They do not forget their mentor. Bezborodov frequently receives letters from persons who once served under him, containing words of gratitude for what he taught them.

It is interesting to observe Veniamin Alekseyevich when, for example, he is helping a squadron commander prepare a flight operations schedule. At such times Bezborodov is lit up by creative inspiration.

"Akimov can be held back a little," he would say to the squadron commander, "while Ruadze must be given some more hours, to give him added confidence."

He figures and calculates. One is amazed at his memory, as he knows precisely the level of training and preparation of a great many pilots. The commander of an aviation subunit can learn a great deal from this experienced air warrior.

Col V. Bezborodov always takes an interest in the attitude of commanders toward young fliers. Clarity and sincerity are so essential here. It is important to him that young people right now gain a profound understanding not only of the problems of their development but also learn the secrets of the methods skills of their elders.

At a readiness check Bezborodov was asking pilots specific questions pertaining to the task at hand. One lieutenant proceeded to answer, followed by another, and a third.... All officers took active part in the discussion. A debate between opposing views spontaneously arises. The colonel listens carefully, and then summarizes: "The decision is correct, but... it is a collective decision. But there will be no assistants in the air!"

His gaze rested on Lt A. Velichko: "Why do you agree with me? I did not give the right parameters. Does that mean that you did not look in the methods manual?"

The lieutenant lowered his gaze, embarrassed, and nodded. Bezborodov felt that it was necessary to add: "I must praise you for your sincerity, but in the briefing room you will relate to me once again the technique of executing these maneuvers."

The fitness report of military pilot 1st class Volonel Bezborodov states the following: "A preeminent expert, with excellent theoretical training, trains pilots of all levels. Hits air and ground targets on the first pass, possesses precision piloting skills, gives concrete assistance to subunit and unit commanders in organizing flight training, has the ability to reveal shortcomings in pilot training and helps correct them...." Behind these lines stands a wealth of flying experience: 4300 flight hours logged, research and methodological work, without which a pilot-inspector is inconceivable, and constant communication with others....

Bezborodov has been repeatedly elected to the position of primary party organization secretary. It is no simple matter to combine a flying job with civic affairs, to be able to plan out one's working day. But Veniamin Alekseyevich manages to do both, completing every job he starts.

The pilot's profession demands that a person constantly work on self-improvement, demanding search and innovativeness. Colonel Bezborodov analyzes in detail every flight before he makes it. Such an analysis enables him to compare different variants and to find the optimal one. This experienced pilot knows that if one takes an uncritical attitude toward flight operations, professional growth will begin to slow.

A young pilot once stated that the time of improvisation in the air had passed together with the piston aircraft and subsonic speeds. He felt that a pilot should not so much deal in innovativeness as execute the flight program and commands received from the ground.

Bezborodov retorted: "Improvisation and innovation in flying are two different things. I agree that improvisation is a thing of the past. Innovation, however, cannot disappear from our profession. What's more, it is indispensable to the pilot. It is essential first and foremost when preparing for a mission. If a pilot has not thought through a mission while still on the ground, has not considered dozens of scenario changes, and has not planned out variant actions in case of a situation change, once in the air he may find himself in a very difficult predicament. On the other hand, if a mission has been preceded by

thorough preparation on the ground, intense mental labor for the purpose of foreseeing the conditions of the mission, a decision made in the air in any situation will be of an innovative nature."

Boldness, decisiveness, and strength of will are characteristic of people of any military profession. But they are expressed more vividly and in greater contrast in the pilot. Dissatisfaction with past achievements, a constant desire to test oneself in a difficult undertaking and to pass on one's knowledge to others -- these are the finest qualities of leading individuals. Col Veniamin Alekseyevich Bezborodov is a pilot whom all the others emulate.

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## HANDLING OF REQUEST, COMPLAINT LETTERS ANALYZED

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[Article, published under the heading "Implementing the Decisions of the 26th CPSU Congress," by military pilot 1st class Lt Col V. Kapranov and Lt Col S. Mikhaylov, inspector, Air Forces Political Department, Moscow Military District: "Attention to Letters -- Sensitivity Toward People"]

[Text] The decisions of the November (1982) CPSU Central Committee Plenum, the Seventh Session of the USSR Supreme Soviet, 10th Convocation, and socialist competition in the military under the slogan "Increase vigilance and reliably guarantee the security of the homeland!" have increased to an even greater degree the professional and political activeness of aviators. This is attested by letters sent to the political agencies and party organizations of military units and military educational institutions. Recently, for example, there has been a substantial increase in the number of letters received by the air forces headquarters and political departments of the Order of Lenin Moscow Military District. In these letters military personnel -- Communist and Komsomol members -- express their patriotic aspiration to improve the quality and effectiveness of combat and political training, to strengthen military discipline, and raise issues connected with further improving life and living conditions in the military, improvement of training facilities, observance of an economy regimen, and reveal deficiencies.

We know what great importance V. I. Lenin attached to working with letters from toilers. He viewed them as a source of highly valuable information on the attitudes of the people and on how party policy is being implemented locally. He obtained from these letters a wealth of vital material, analysis of which sometimes helped him make very important decisions. Vladimir Il'ich taught us to see a living person behind each letter, to treat letters and complaints sensitively and attentively, conscientiously to record and thoroughly to investigate them, enlisting representatives of the working people for this purpose, to make decisions in a prompt and timely manner, systematically to verify execution, and to call strictly to account those who are guilty of formalism and bureaucracy in their examination and who avoid reaching a concrete decision on questions which have been raised.



The Communist Party consistently implements Lenin's demands pertaining to working with citizen written and oral communications and instills in party, soviet and economic cadres an attentive and sensitive attitude toward them. The CPSU Central Committee decree entitled "On Measures to Achieve Further Improvement in Work With Letters and Suggestions From Toilers in Light of the Decisions of the 26th CPSU Congress" emphasizes that each and every Soviet official, each and every enterprise and establishment officer is obligated to view work with letters and suggestions as his duty to the people and party.

Implementation of these demands occupies a central place in the activities of political agencies and party organizations of the air forces of the Order of Lenin Moscow Military District. An inspection conducted by officers of the Air Forces Political Department of the Moscow Military District indicated that unit and subunit command authorities, political agencies, and party organizations for the most part examine in a prompt and timely manner received letters and suggestions from military personnel, civilian workers and employees, and the members of their families and immediately make the necessary decisions in response to them. Party and administrative measures are taken against inattentive and callous officials who are guilty of formalism and red tape in handling letters.

Meriting attention is the job of handling letters done at the pilot higher military aviation school to which officer N. Safonov is attached. At this school they keep a record of correspondence and verify execution of decisions in response to letters, send prompt replies to letter writers, and respond immediately to requests, complaints, and critical remarks. Communist Party and Soviet Government decisions pertaining to handling and response to letters, and the requirements of the USSR minister of defense, commander in chief of the Air Forces, and the commander of the district on this matter are continuously explained to officer personnel. They have organized study with leader personnel of the ukase of the Presidium of the USSR Supreme Soviet entitled "On the Procedure of Examining Citizen Suggestions, Requests, and Complaints." Commanders and political workers, propagandists and military legal specialists address enlisted personnel, enrolled personnel, noncommissioned officers and warrant officers, clarifying for them Soviet laws and the requirements of the military oath and general military regulations, especially the USSR Armed Forces Disciplinary Regulations. Many legal knowledge schools and study groups are actively functioning.

Well organized explanatory work helps reduce the number of letters and complaints submitted to central and soviet agencies. The character of letters is changing to an increasingly more appreciable extent. The majority of their authors display profound interest in matters pertaining to further increasing combat readiness, the quality and effectiveness of combat training, indoctrination of personnel, and make concrete suggestions aimed at improving training facilities, cultural conditions, living conditions, and trade facilities for personnel.

An example of a businesslike approach to handling letters is displayed in the unit in which officer V. Druzhinin serves. A soldier sent to the higher-echelon political agency a letter in which he pointed to deficiencies in readying aircraft

aircraft equipment and made suggestions on increasing combat readiness and shortening the time required to fuel aircraft.

The facts presented in the letter were thoroughly studied and discussed at a party meeting. Their validity was confirmed in statements by party members V. Bolotnikov and V. Khokhlov. Responding to the suggestions of party members, the commanding officer, party committee, and party bureau paid greater attention to qualitative indicators in combat and political training and to matters pertaining to servicing aircraft.

At one time there were shortcomings noted here in trade and services facilities for military personnel and their families. Receiving warning signs, the command authorities immediately proceeded to take steps. Party organizations, people's control agencies, and the women's council joined in. Working together, they were able to accomplish a great deal and solve urgent problems.

Warnings were also coming from this same garrison about deficiencies in organization of the training and indoctrination process, military personnel daily life and living conditions, and provision of housing and services facilities. A letter from officer I. Orel, for example, reported that inducted personnel were being poorly provided with food and equipment and that the garrison medical facility lacked the necessary medicines.

All facts presented in the letter were carefully verified. In the course of verification the overwhelming majority of noted deficiencies were corrected. The concrete measures which were taken made it possible to rectify the situation.

Analysis indicates that a certain percentage of complaints are engendered by deficiencies in the work style and methods of certain commanders and political workers, by poor knowledge of laws, military regulations, and orders issued by higher commanders. There are instances, for example, when commanders discharge a Soviet Army civilian employee without coordinating their decision with the trade union committee.

Our party's Central Committee demands that replies to letter writers be concrete, convincing, and cover the entire range of issues raised in the letters. They must state whether their claims have been confirmed and whether their requests and demands have been met or rejected. In case of refusal, they are to explain why the complaint is without merit, substantiated by reference to a law or other legal enactment. Practical experience indicates that the lack of a clear statement of reason for refusal or rejection is one of the factors engendering repeat letters. This occurs as a rule in those cases when the original complaint was examined unconscientiously, carelessly, or where red tape occurred.

Unfortunately, such cases still occur. Here is an example. G. Obidina, wife of a serviceman, and L. Nikol'skaya, flight-technical mess employee, wrote to the appropriate unit officials requesting clarification of certain provisions of labor legislation and entitlement to receive and maintain benefits and privileges. This is unquestionably an important issue. Nevertheless these

women failed to receive a clear-cut, competent reply and were forced to appeal to higher authorities.

District air forces unit and subunit political agencies and party organizations constantly concern themselves with improving the handling of letters and complaints and demand that officials deal attentively with people's needs and requests. Matters pertaining to receiving office visitors and handling letters and complaints are now regularly discussed at meetings and conferences. These matters have been discussed, in particular, at the district air forces military council and at a conference of ranking officials with unit and subunit commanders and political workers.

Political agencies and party organizations are obligated to inform personnel on action taken on suggestions and comments. There are many opportunities for this -- individual and group talks, general meetings of military personnel, question-and-answer evenings, and unified political education days. One can cite a great many examples of skilled preparation for and conduct of such measures.

For example, in the unit in which officer V. Novikov serves as political worker, during a unified political education day they arranged for and held receiving hours to accommodate personal questions by military personnel and the members of their families. A practical and frank discussion was greatly fostered by informing military personnel in advance about the forthcoming political education day, preparation of questions by personnel, and preliminary analysis of these questions. Participants in receiving personal questions included the Moscow Military District air forces commander and the political department chief, a military council member. Suggestions and requests by aviation personnel and members of their families (both those which were settled on the spot and those which required time for a reply) were synthesized, and a decision was made on each, with personnel subsequently being informed on the measures taken.

Recently a new form of handling letters and suggestions from military personnel -- open letter day -- has become increasingly established. This presents the opportunity to settle matters of concern to people in a concrete and businesslike manner, to make people better informed, and to strengthen ties between leaders and the masses, as is demanded by the instructions of the 26th CPSU Congress.

An investigation indicates that district air forces unit and subunit commanders and political workers, party committees and bureaus have increased demandingness on party members for carrying out party and job duties in regard to handling letters, requests and complaints, and are now holding more strictly to account persons guilty of errors of omission and shortcomings. This is producing positive results. Central party and soviet agencies are receiving fewer letters and complaints, and the nature of these letters is changing appreciably. Military personnel are less and less frequently turning to political agencies with requests of a personal nature, and are increasingly more frequently bringing up matters which are in the interests of military units and subunits. This is due to the fact that there are fewer reasons to complain about rudeness, insensitivity, negligence, and abuses. Another and no less important reason is the fact that servicemen are becoming socially more mature, their civic and political

activeness is growing, and they are seeing primarily the common, rather than the personal behind phenomena and facts.

A solicitous attitude on the part of commanders, political workers, and party organizations toward letters, requests, complaints, and suggestions, a sincere desire to help resolve a given problem, and the ability to rely on collective experience and know-how are promoting increased combat readiness and strengthening of discipline and order in units and subunits, and are helping maintain a healthy moral atmosphere in military collectives.

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## AVIATION WORKER TRADE UNION PERFORMANCE EVALUATED

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[Article, published under the heading "26th CPSU Congress: Problems of Theory and Practice," by V. Kalosha, secretary of the Central Committee of the Trade Union of Aviation Workers: "Taking Increased Demands Into Account"]

[Text] The 17th Congress of USSR Trade Unions defined clear, concrete prospects for the continued struggle by working people for successful implementation of the historic decisions of the 26th CPSU Congress and confirmed the faithfulness of the Soviet trade union movement to the principles of internationalism, and the firm resolve on the part of the peoples of the Soviet Union to defend the cause of peace and the ideals of communism.

The period since the USSR trade union congress has been filled with events of enormous sociopolitical significance. The May and November CPSU Central Committee plenums were held last year, vividly confirming the party's concern for the working man, his material and intellectual growth. Celebration of the 60th anniversary of establishment of the Union of Soviet Socialist Republics constituted convincing evidence of the monolithic unity of the Soviet people behind the Leninist Communist Party.

Carrying out the party's decisions, trade union organizations are directing their efforts toward accomplishing the main task of the 11th Five-Year Plan -- securement of a further rise in the prosperity of the Soviet people, on the basis of stable, forward development of the nation's economy, acceleration of scientific and technological advance and movement by the economy onto an intensive path of development, more efficient utilization of this country's production potential, all-out economizing in all types of resources, and improvement in the quality of work performed. The 17th USSR Trade Union Congress and the 16th Congress of the Trade Union of Aviation Workers directed branch trade union committees, jointly with officials of enterprises and establishments, to carry out measures aimed at further improving the organization of socialist competition as an effective means of boosting labor productivity, as well as toward all-out strengthening of labor discipline in workforces.

We should note that thanks to these measures, in the Air Forces there has been a substantial increase in the number of participants in the movement for a

Communist attitude toward labor, the 25th anniversary of which was extensively celebrated recently in this country. Many workers and employees have become shock workers of Communist labor. More than half of the structural subdivisions of aviation enterprises and establishments are taking part in the competition for earning the prestigious title "Communist Labor Workforce." Work is being done in this industry directed toward adoption of counterplans by workforces, which will ensure additional production growth by almost 1 percent in 1983, with a corresponding increase in labor productivity.

The 17th USSR Trade Union Conference devoted considerable attention to all-out development of the brigade form of organization of labor and labor incentive. Our trade union organizations are aggressively adopting it. The brigade form of organization of labor presently encompasses the absolute majority of aviation enterprise workers, while more than half of the brigades in operation are successfully applying a labor participation factor in distribution of wages.

We must note that the brigade form produces positive results in the area of strengthening labor and production discipline. Last year demonstrated that in one out of every two brigades at many aviation enterprises there were no violations of labor discipline.

All this is helping to ensure that this year the workforces of Air Forces enterprises are achieving excellent performance results in meeting plan targets and socialist pledges. In particular, the plan target pertaining to volume of product sales and labor productivity growth is being successfully met. Due to aggressive adoption into production of advanced technology, advanced know-how and scientific organization of labor, as well as enhancement of the role of permanently functioning production conferences and strengthening of labor discipline, production volume is increasing, and quality and reliability of repaired aircraft and ground flight operations support equipment are improving. The enterprises directed by I. Rybin and O. Novosel'skiy and the trade union committees headed by Ye. Sobol' and D. Polonnikov rightfully earned award of challenge Red Banners of the CPSU Central Committee, USSR Council of Ministers, All-Union Central Trade Union Council, and the Komsomol Central Committee. In addition, the enterprise headed by I. Rybin has for the second year in a row been on the All-Union Honor Board at the All-Union Exhibit of Achievements of the National Economy of the USSR. Air Forces establishments which have achieved the highest competition performance results this year include the collectives headed by party members A. Molotkov and L. Agurin, the respective trade union committee chairmen of which are P. Klyaus and V. Gnezdilova. Of course this is a far from complete list of leading workforces. We can state with confidence that all of them are united by a common desire to respond to the party's concern for the working man, his material and intellectual development with new labor achievements and excellent successes in accomplishing the tasks assigned by the 26th CPSU Congress.

We are proud of the fact that worker-innovators are born in our workforces, whose ideas and labor find embodiment in the latest scientific and technical advances. For example, top aviation enterprise workers M. Mikhnevskiy and V. Romashko were awarded the USSR State Prize for 1982 for initiative and innovativeness in development of socialist competition, for highly effective work performance and quality of repairs performed on aircraft equipment.

Today we can note that the work being conducted by management, party and trade union agencies of Air Forces enterprises, establishment and organizations toward further development of socialist competition and strengthening of labor and production discipline this year is producing positive results and helping increase the combat readiness of the Air Forces.

In the period since the 17th USSR Trade Union Congress, branch trade unions have confidently been implementing the points specified at the 26th CPSU Congress on a good-management, thrifty attitude toward public property and appropriate utilization of all available reserve potential. This has been confirmed by the results of the public review of efficiency of utilization of raw materials, supplies, and fuel-energy resources conducted in honor of the 60th anniversary of establishment of the USSR. More than 4.5 million rubles have been saved. Savings from the adoption of efficiency innovator proposals and inventions have totaled approximately 2 million rubles. Some Air Forces workforces have been awarded certificates of the All-Union Central Trade Union Council, the Komsomol Central Committee, and USSR Gosstab for excellent performance results in achieving savings in raw materials and supplies.

Guided by the decree of the May (1982) CPSU Central Committee Plenum, trade union committees and officials of the enterprises of this branch have addressed themselves to the organization of subsidiary food production operations. Their main areas of activity include growing fruits and vegetables and development of animal husbandry. Long-term plans running up to the year 1990 have been drawn up. The subsidiary food production operations of the enterprises headed by N. Burmin and M. Laptev, the trade union committee chairmen at which are V. Novinskiy and G. Ivanov respectively, are already producing definite results, for example. Greenhouse operations are also successfully developing at many other enterprises. Making an overall appraisal of the current status of these activities in this branch, however, we cannot claim satisfaction with achieved results. Trade union committees, together with the officials of enterprises and organizations, have a big, important job to do in implementing the formulated plans -- doing what we can to contribute to the USSR Food Program.

Fulfillment of the terms of collective contracts and agreements on industrial health and safety comprises a significant part of the work activities of management and trade union committees at Air Forces enterprises and establishments. These documents are important legislative enactments and play a large role in the production and labor activities of every workforce.

There are still deficiencies in this area, however. At some enterprises, for example, many points in collective contracts are general in nature and fail to address the main issues of production and social development. One unfortunately still encounters commanders who fail to comprehend the full span of personal responsibility for meeting contractual obligations, while trade union committees fail to display proper persistence in this matter. This deficiency must be corrected.

For the sake of fairness we must also note that not everything has yet been done locally to implement the party's demands regarding strengthening labor discipline and observance of safety rules and procedures on the job. This was



the subject of an earnest discussion at the Fourth Plenum of the Central Committee of the Trade Union of Aviation Workers, at which critical comments were directed toward Air Forces trade union agencies. Many territorial and trade union committees do not regularly address matters of strengthening labor discipline and fail to display adequate persistence in implementing specified measures to correct the causes of violations of labor discipline. Now everywhere are they rigorously recording and thoroughly analyzing work time losses.

There is no need to state that there is no place for lack of discipline and slipshodness, particularly in aviation enterprise workforces, since these have a negative effect on the state of combat readiness of Air Forces units and subunits.

The state of safety rules and procedures also requires continuous improvement. There are still enterprises and military educational institutions at which progress is slow in eliminating injury on the job. Analysis of past accidents on the job indicates that the main cause is to be found in unsatisfactory maintenance of work stations and the premises of enterprises and establishments. This applies particularly to the military unit under the command of officer A. Yagol'nikov, in which A. Apter is the trade union committee chairman. They have received stern warnings about such deficiencies from higher authorities and the Central Committee of the Trade Union of Aviation Workers. The territorial trade union committee headed by V. Podnebesnyy should also draw the proper conclusions.

Near and dear to us all is the thought expressed by CPSU Central Committee General Secretary Comrade Yu. V. Andropov at the November (1982) CPSU Central Committee Plenum: "It is especially important and necessary today that each and every working person realize that plan fulfillment depends on his contribution of labor, that everybody clearly understand the simple truth that the better we work, the better we shall live." Proceeding from this, our trade union committees, together with officials and party organizations of enterprises and establishment, are endeavoring to raise the level of political indoctrination work and are making extensive use of worker meetings, mentorship, and the know-how of innovators and labor veterans, displaying constant concern for improving health and safety conditions for workers and employees, both on and off the job, and for meeting their needs. The housing construction plan, for example, has been fully achieved at all enterprises. Last year approximately 5 million rubles were spent on projects specified by the comprehensive plans for improving worker health and safety. Renovation and major repairs on production buildings and structures were performed to the tune of 1.26 million rubles, which made it possible additionally to bring into use more than 3,000 square meters of worker health and services facilities.

This branch's trade union committees have improved dissemination of legal information among workers and employees, are more closely monitoring observance of labor and housing laws, and are responding more vigorously to violations of the law on working and rest conditions which still occur, taking effective measures to correct deficiencies. Since the 17th USSR Trade Union Congress, branch committees have implemented an entire aggregate of measures specified by the 26th CPSU Congress to achieve further development of social insurance,



pension provisions, expansion of government assistance to families with children, and strengthening the health of aviation workers. Air Forces repair and overhaul enterprises are setting up their own medical treatment and preventive medicine facilities to provide immediate and efficient medical care to our working people.

The activities of territorial trade union committees have been stepped up appreciably in the area of settling matters pertaining to economic and social development of this branch, financial and other matters, with the assistance of the appropriate commanders, political agencies, and party organizations. Trade union central committees and territorial committees constantly concern themselves with more closely monitoring observance of the terms of collective contracts as well as observance of labor laws and industrial health and safety requirements. Trade union Central Committee and territorial committee officials have traveled to the localities to provide concrete assistance to trade union committees. Working together with command authorities and political agencies, they have promptly taken steps to correct revealed deficiencies.

The new Statute on the Trade Union Group Organizer (profgruporg) increases the responsibility of these group leaders for the state of affairs in workforces and enlarges their authorities within the system of economic management and possibilities of contacts between trade union group organizers, brigade leaders, and production brigade councils.

Guided by the party's instructions to the effect that competent persons must be more boldly advanced to leader positions, persons who have been tutored in the school of organizing activity, who are familiar with the interests and needs of the working people, we are doing continuous, purposeful work in this area. For example, one out of every five persons elected to the position of trade union group organizer is a Communist, while more than half are production workers with higher and secondary education. Or take such a category as chairmen of trade union committees. Two thirds are CPSU members, more than half are women, and virtually all have higher or secondary education. A great deal is also being done to improve the system of training trade union cadres.

Work is continuing at the present time to improve the structure of trade union organizations in this branch, which makes it possible to strengthen their influence on the production activities of workforces and to increase the labor and sociopolitical activeness of workers and employees in implementing the decisions of the 26th CPSU Congress and the 17th USSR Trade Union Congress.

There is no doubt that all these measures, taking increased demands into account, will foster further strengthening of discipline and organization in Air Forces workforces, as well as increasing their activeness in increasing production successes. It is important today for trade union organizations, under the guidance of party agencies, to bolster people's enthusiasm, their aspiration to work with greater results from diversified organizational and political work, and to place on a concrete, businesslike foundation the campaign to implement plans.

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## NEW BOOK EXPOSES IMPERIALIST AIMS

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[Article, published under the heading "On the Battle Fronts of the Ideological Struggle," by V. Sokolov: "Military Threat: Myths and Reality"]

[Text] Reactionary circles of U.S. imperialism are waging an extensive campaign of slander against the USSR and the nations of the socialist community. Its purpose is to substantiate the notorious myth about a "Soviet military threat" and to escalate militarist preparations under the cover of this myth. Discussing the "aggressiveness" of the Soviet Union, U.S. President R. Reagan and other White House officials are attempting to delude progressive world public opinion. This reconfirms Lenin's ingenious thought: when the ideological influence of the bourgeoisie on the workers declines, is undermined, is weakened, the bourgeoisie has everywhere and always resorted and will continue to resort to the most desperate lies and slander."

The military preparations of imperialism are not defensive but are purely aggressive in nature. This is attested, for example, by the unified, integrated strategic plan devised by the Pentagon, calling for joint, closely coordinated actions by all components of U.S. strategic offensive forces.

This article, which is based on factual material contained in a book published by Voenizdat, exposes the aggressive character of imperialism.\*

Events and facts of recent decades attest to growing efforts on the part of the reactionary forces of imperialism to strengthen their position in countries which have been liberated from the colonial yoke. The neocolonialist policy of

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\* A. A. Bulatov, "Neokolonializm v voyennom mundire (Imperializm: Sobytiya. Fakty. Dokumenty)" [Neocolonialism in a Military Uniform (Imperialism: Events. Facts. Documents)], Moscow, Voenizdat, 1982, 42 pages, 25 kopecks.

imperialist circles is characterized by high-handed interference in the domestic and foreign affairs of these countries, by the undisguised or indirect use of military force. U.S. imperialism is the organizer of a "crusade" against the forces of national liberation.

Military force has always played a dominant role in U.S. history. In its slightly more than 200 years, the United States has initiated more than 200 wars and colonial campaigns.

Military business provides U.S. industrial corporations with immense profits. According to U.S. figures, at enterprises which produce military goods, profit is 60 percent greater than at nonmilitary enterprises. The profits of some companies run as high as 500 percent. The big monopolies, which manufacture arms and combat equipment, endeavor to guarantee continuing superprofits and to consolidate their position by establishing close ties with the representatives of the military. This alliance, which has been given the name military-industrial complex, is a most powerful force, which exerts decisive influence on the forming of aggressive U.S. military and foreign policy.

Securing for itself a dominant position among the capitalist nations, U.S. imperialism set for itself the goal of world domination. The idea of global hegemony, especially in the era of the collapse of colonialism, is becoming the principal content of imperialist foreign policy, which is directed toward crushing the national liberation movement and "containment of communism."

This idea is eloquently emphasized by a book recently published by Voenizdat, which reveals the essence of neocolonialism and shows where, how, and when the imperialists utilize their military strength in order to force on liberated countries regimes and systems to the imperialists' liking. This book will assist political workers and the large detachment of propagandists in their efforts to expose the aggressive essence of imperialism, which is attempting to plunge the world into the flames of a nuclear missile holocaust.

The book contains four chapters: "Colonialists Change Their Appearance," "Counting on Force," "Subversive Actions in the Economy, Politics, and Ideology," and "Military Blocs of Imperialism and Neocolonialism." One can judge by the chapter titles that the book's principal content involves exposing imperialist policy aimed at enslaving liberated countries.

The imperialists are stopping at nothing in order to continue controlling the destiny of the people of developing countries and to exploit their natural resources. The Western powers, especially the United States, are declaring many parts of Asia, Africa, and Latin America "vital spheres of interest," are shackling them with an extensive network of military bases, and are kindling wars and military conflicts in these regions. They extensively utilize terror tactics and violence against peoples fighting for their liberation. According to official figures, the United States maintains military bases in 32 foreign countries. More than 500,000 U.S. officers and men are stationed on foreign soil, where they are operating more than 1500 military bases and installations and have at their disposal more than 15,000 nuclear warheads.

In the struggle for world domination, of which U.S. neocolonialist policy is a part, the strategists across the ocean assign an important role to their air forces. "Our troops and bases, ships and air forces," wrote U.S. Admiral A. Burke, "represent a springboard for strikes against Soviet Russia. They are deployed in such a manner that they encircle Russia practically on all sides. Take a look at a map of the world and you will see that they are reminiscent of the jaws of an enormous crocodile, ready to snap shut at any moment."

According to figures in the Western press, the Pentagon assigns carrier-based aviation deployed in the Arabian Sea and Persian Gulf the mission of striking the USSR and its allies with both conventional and nuclear weapons, as well as providing close air and ship support to ground troops.

The author also cites the following fact: under the pretext of protecting certain countries in the Near and Middle East, but in actual fact in order to keep the entire region under its electronic gunsight and to guide U.S. warships and aircraft, the Pentagon has set up a ground radar station in Saudi Arabia which operates jointly with four E-3A AWACS aircraft flying over the Persian Gulf. A total of 400 U.S. personnel operate and support the aircraft and radars.

The author reports that the so-called "rapid deployment forces," in addition to ground armies, contained in 1981 the 27th, 49th, 347th, 354th, and 552nd Air Force wings, flying F-111, F-15, F-4, A-10, and A-3A aircraft, plus six squadrons of C-130s, plus naval forces including three carrier attack groups, three amphibious groups, and five air patrol squadrons.

There are more than enough facts of participation by U.S. and NATO member nation air forces in the White House's neocolonialist policy. In combination with ground troops and naval forces, they represent a large threat to peace and security of peoples.

But whatever means of struggle -- economic, political, ideological, or military -- are employed by imperialist reaction, attempts to reenslave liberated countries are doomed to failure. The peoples of these countries, supported by all revolutionary forces of the present day, are increasing their vigilance against imperialist intrigues. "The USSR totally rejects the view of those who would attempt to convince people that force and weapons decide everything and always will decide everything," stated CPSU Central Committee General Secretary Comrade Yu. V. Andropov at the November (1982) CPSU Central Committee Plenum. "Peoples are today advancing to the stage front of history as never before. They have gained the right to vote, which nobody can silence. They are capable of eliminating the threat of nuclear war by means of aggressive and purposeful actions; they are capable of preserving peace and, consequently, life on earth. And the Communist Party of the Soviet Union and the Soviet State will do everything to ensure that this is the way things will be."

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## GROUND-ATTACK HELICOPTER TACTICS DESCRIBED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 6, Jun 83 (signed to press 4 May 83) p 11

[Article, published under the heading "Tactics and Simulation," by military pilot 1st class Col B. Nesterov: "The Quest for New Techniques"]

[Text] The tactical air exercise was in full swing. Having failed in a meeting engagement, the "aggressor" decided to engage his support echelons and seize the initiative. Reconnaissance aircraft, however, promptly spotted the troop redeployment. Analysis of photographic materials revealed the "enemy's" plan and made it possible to determine the point and direction of the imminent counterthrust.

The pilots of the combat helicopter subunit under the command of Capt A. Nikiforov were assigned the mission of impeding the advance of "aggressor" reserves from tactical depth.

Intelligence indicated that tanks were advancing to the line of contact in small groups of three or four vehicles each, with a spacing of 4-5 kilometers between groups, following parallel routes. The advancing tank subunits were being provided cover by self-propelled antiaircraft guns and antiaircraft missile systems.

Captain Nikiforov made his decision: exploiting the element of surprise, they would attack the targets simultaneously from different directions. They would fly nap-of-the-earth in order to ensure reaching the strike area undetected and to reduce the effectiveness of "enemy" air defense countermeasures. Radio silence was to be broken only in an extreme emergency.

It took a certain amount of time to prepare for the mock combat mission and for the helicopters to fly into the objective area, during which time the ground tactical situation had changed: the tanks had left the grid square in which they were reconnaissance-detected. As a result the pilots had to spend considerable time searching for them, identifying them, and executing an additional maneuver in order to mount an effective attack. Thus the element of surprise was lost, they were unable to fly directly into the attack, and the probability that the helicopters would take hits from ground weapons increased. In addition,

the situation change forced the commander to break radio silence, and the "enemy" spotted the helicopters. They jammed the radio communications channel, making helicopter control communications difficult. The helicopters accomplished their mission, but with less effect and with greater expenditure of ordnance.

At the post-mission critique the squadron commander pointed out to the group leader the fact that the time factor had been underrated and that the mock battle area had only been superficially studied. He reminded them that today's combat frequently takes place in difficult, conflicting conditions and teems with unexpected turns of events. Therefore the actual situation often fails to coincide with the forecast situation. This means that helicopter crews must be prepared at all times to respond instantly to situation changes and to employ one of several variations worked out in advance. The squadron commander instructed the helicopter crews to restudy the methods and tactics of attacking armored targets.

Captain Nikiforov was deeply chagrined at the mission failure, but he did not give up. First he decided to analyze the mission in detail, stage by stage. It was necessary to reconstruct the situation, recall all the elements of the engagement, and critically to scrutinize their actions. Then, focusing particular attention on engagement of the adversary, they would devise several standard variations, which the crews should adopt as a nucleus and apply only in conformity with the specifically evolving situation and the mission being performed. It was necessary to act in such a manner that the "adversary" would be unable to figure out the plan, even when the outcome of the engagement was already being determined in favor of the helicopters.

The section pilots set to work. They argued, each defending his own view. Sometime later they had created a new model of a mission to search out and destroy armored targets. Captain Nikiforov concluded that the mission could have been accomplished with three helicopters. In that variation, the formation would include a two-helicopter search and attack element, and a single helicopter to provide cover. The attack element would fly in open formation, parallel to the battle line. The wingman would be positioned slightly rearward of and slightly higher than the leader. The third helicopter would bring up the rear at a distance ensuring good visual contact and mutual fire support. They would fly nap-of-the-earth and at optimal speed. Following the commands (maneuvers) of the leader, they would periodically execute turns toward one another with a 15 or 30 degree bank and exchange positions in the formation. This maneuvering would make it possible to increase the range of detection of camouflaged and concealed small targets, would lessen the accuracy of fire by "enemy" ground air defense weapons, and would improve observation of the rearward hemisphere.

The commander of the section mans the cover helicopter. His principal task is tactical control. He suppresses spotted weapon positions delivering fire on the forward helicopters from the flanks, thwarts "enemy" attacks, and is the first to attack the ground target if for some reason the attack element is late in spotting it. Observing the battlefield, the commander continuously analyzes the situation, in order if necessary to employ the most effective weapon, and corrects the actions of the aircrews under his command. His second

in command is with the attack element and is prepared at all times to take over command of the group. A prior-selected radio frequency is used for tactical control. If one band is jammed, the pilots immediately, without additional command, switch to alternate frequencies on a time sequence worked out in advance.

As they begin to get within range of "hostile" air defense, the helicopters proceed to maneuver back and forth, changing formation, and utilizing terrain cover. The helicopters fly in slipping mode, which makes it possible to maintain fire and tactical coordination within the group and to diminish effectiveness of air defense fire. If the attack element is threatened with attack by "enemy" helicopters, the commander will cut them off and ensure that the principal mission is accomplished. In this case the spacing between helicopters should be increased. If attacking helicopters are detected, the group commander informs the element out ahead and helps them execute an antihelicopter maneuver. At the same time he takes up a position for attack. Since the "enemy" will most probably employ machineguns, cannon and rockets, the effective range of which is not too great, he will attempt to close to effective fire delivery range as quickly as possible, at maximum combat maneuvering speeds.

In this situation one of the most probable antihelicopter maneuvers will be a turn into the attackers at maximum allowable G-load. This maneuver will result in high angles of approach, which will make an aimed-fire attack difficult. After thwarting an "enemy" helicopter attack, a situation may develop where it is more convenient to attack the ground target not with the attack element but with the covering helicopter. In this case the attack element will provide support and prepare to deliver fire.

The variation devised by the pilots of Captain Nikiforov's section aroused the commander's interest. Checking the calculation, he became convinced that for the specific situation this was the most advantageous variation of search and attack against small ground targets, and he suggested that they also devise other techniques and modes.

The section was off on another mission. This time the pilots performed with precision. They precisely intercepted the target, promptly identified it and, without a pause, attacked with antitank guided missiles and rockets. Additional passes were run from other directions. The mission was accomplished with a mark of excellent.

The aircrews gained good practical experience. They learned through personal experience that well-planned attack variations which have been rehearsed in advance are of great importance for successfully engaging and completing combat, as well as detailed knowledge of the combat area, means and methods of identifying friendly troops, target designation signals, and precise coordination with a ground or airborne forward air controller in a light reconnaissance helicopter.

Combat training experience and tactical flight exercises conducted jointly with ground subunits have shown that the greater the number of standard combat variations available in the arsenal of commanders and aircrews, and the stronger the moral-psychological conditioning of aircrews, the better and more successfully combat missions are accomplished.

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# KOMSOMOL ACTIVISTS URGED TO BE INNOVATIVE IN INDOCTRINATION WORK

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 6, Jun 83 (signed to press 4 May 83) pp 12-13

[Article, published under the heading "Implementing the Decisions of the 19th Komsomol Congress," by Capt N. Chebotarev, assistant political section chief for Komsomol affairs: "Fire Ignites Fire"]

[Text] The incident with which I shall begin this article happened at the end of the last training year. It is instructive for Komsomol activists.

The head librarian of the unit where I was about to address aviation personnel had kind things to say about Lt S. Semenov.

"Quite a reader, a well-educated young officer," she said.

"Lieutenant Semenov?" I said to myself. "Is he not that officer about whom the squadron Komsomol committee secretary spoke of as a Komsomol member with little initiative?" He was once given the assignment to speak at a specific-topic evening event, but he refused, claiming he was too busy. Soon thereafter he used the same reason to decline to hold a discussion on vigilance with young aviation specialists.

It seems that the librarian was in fact referring to that same officer. Two different opinions about the same person? Which one was correct?

A desire to look into the motives behind the lieutenant's actions compelled me to look him up and talk with him. I met the young officer in the squadron Lenin Room. Leafing through a file of newspapers, he was taking down notes in a notebook. We struck up a conversation. I learned that Semenov was preparing to present a political briefing session and was gathering material, analyzing facts, and comparing figures.

When I asked him why he recently declined to perform a Komsomol assignment, Semenov replied: "You know, how should one look at this? On the one hand the secretary would seem to be right, but on the other.... For a talk at a specific-topic evening event they offered me... newspaper clippings and a prepared text. A simple task, they said: just read off the prepared material, and the job is done. Incidentally, that is the way it was with the other



speakers. And yet the evening's topic was 'We Shall Continue and Further Build Upon the Traditions of Our Regiment!' I tried to object. I asked them why they had not warned me, why they had not given me a chance to give some thought to the topic. Perhaps I would give a more interesting presentation relating how my comrades and I are continuing the traditions of the combat veterans and what contribution our squadron is making to the overall aggregate of good performances! After all, officers and enlisted men are serving with me, from cities and towns which our regiment liberated during the war. Why not write letters to veterans of the unit, in which we would tell them about what we are doing, what we are achieving, and would request that they share their reminiscences about the war? I said all this to the committee secretary. He felt insulted, telling me that I was undermining his authority.... And as for Komsomol assignments, I do not turn them down. It is simply that I am against stock phrases and lack of originality."

What could I say? Indeed, preparation for the Komsomol-youth evening had been done in an unoriginal manner, without innovative thought. At best the Komsomol activists had prepared texts teeming with general phrases and appeals. How could there be any profound analysis of the successes and shortcomings of the squadron's aviators in combat and political training? Particularly since for quite some time the Komsomol committee had not discussed at its meetings how Komsomol members were carrying out their socialist pledges and accomplishing one of the main tasks -- provision of excellent support services for flight operations. And such an effective form of activity as receiving reports by Komsomol members was rarely employed.

Is it perhaps that all the Komsomol members in the squadron are excellent-rated or that there have been no violations of military discipline? Unfortunately, not so. Lt A. Rezminovich, for example, displayed poor knowledge at Marxist-Leninist training classes. Some young officers, recent service school graduates, were doing little reading and sometimes were not even registered at the library. And Lt V. Ivanov had violated military discipline.

In other words this subunit's Komsomol activists, including the secretary, in organizing ideological indoctrination work with young people, did not take the trouble to consider that each and every Komsomol-youth activity should stir a person's emotions, touch one's mind and heart, arouse a person to action. After all, these are the demands of the 19th Komsomol Congress and, if you will, a call of the times.

In connection with this I recall a special evening event entitled "Officer -- A Heroic Profession," prepared by members of the Komsomol committee of the unit in which Capt V. Kharchenko serves.

First his plan was approved at a committee meeting. Then the activists, with the assistance of headquarters Communists and squadron Komsomol members, carefully analyzed the successes and shortcomings of the young officers. They prepared news bulletins dedicated to aviation personnel. For example, to Sr Lt A. Sholda, commander of a leading flight, who was awarded the Komsomol Central Committee Badge of Military Valor, and Sr Lt Tech Serv I. Skuratovskiy, ground maintenance technician of an excellent-rated aircraft and the best specialist

in the unit. In addition, Komsomol activists prepared attractive visual propaganda materials presenting CPSU demands on officer cadres. They also prepared displays relating the heroic deeds of Soviet commanders in peacetime and in time of war, as well as an exhibit of military memoir literature. Topics were assigned to speakers in advance and they were assigned, at the advice of the party committee, experienced, knowledgeable young Communists working in Komsomol.

The special evening event began with listening to V. I. Lenin's speech at the Third Komsomol Congress. This was followed by a brief but meaty report by political worker Lt Col V. Dushenko. He told how aviator combat training was progressing, how the young officers were achieving excellent results in combat and political training, and named the top pilots, engineers, and technicians. His presentation was supplemented by squadron commander Lt Col V. Subbotin, whose men had pledged to earn it an excellent rating, by Engr-Capt F. Smol'nikov, one of the finest specialists in the unit, and by aircraft technician Lt Tech Serv I. Utin. They all discussed the officers' contribution to the cause of further increase in combat readiness, high-quality performance of flight operations, and strengthening of military discipline.

Then Soviet Army civilian employee L. Abasheva, who worked at the garrison library, told the audience about the pilots, navigators, and technicians whose selfless military labor is celebrated in the works of Soviet prose writers and poets.

Before viewing the feature film "Officers," Capt V. Kharchenko, speaking on behalf of the young officers, assured the command authorities and the unit party committee that the lieutenants of the 1980's are honorably carrying on the fine traditions of the men of the regiment.

It would be superfluous to say that after such a interesting special evening event many lieutenants saw their job and their attitude toward training in a different light, and they began approaching some problems more seriously. Of course one cannot say that this event had turned their consciousness around, but it had given a definite jolt, had opened the lieutenants' eyes to their place in the military. At a tactical flight exercise held soon thereafter, the young officers performed efficiently, confidently intercepted "hostile" aircraft, and selflessly readied aircraft for following missions. It is noteworthy that some of the young aviation specialists who had been present at the special evening event submitted requests for permission to enroll in military aviation schools.

It is no easy matter to arouse emotions, to awaken positive feelings in Komsomol members, a desire to perform all tasks with excellent quality, to carry out one's military duty with honor. To achieve this, the Komsomol activist must seek the most effective work forms, must be creative and inventive. Only in this case does the energy of thought become transformed into practical deeds.

For example, on the eve of the exercise unit Komsomol committee member Sr Lt V. Volosevich had proposed conducting a unique military-technical relay and

with the permission of the authorities, enlisting young subunit commanders to prepare for it. They conducted such an activity. Sr Lt V. Antipov's men won the competition. The aviators of this subunit had responded to an alert and assembled at the designated location faster than all the others. They were also first in assault rifle assembly and field stripping, pellet rifle marksmanship, were fastest in donning the all-arms set of protective gear, and correctly answered questions on regulations.

This work form, skillfully found by the Komsomol activist, aroused in the men the desire to study even more thoroughly the combat equipment and the requirements of guideline documents. As a result they received a mark of excellent at the exercise, at which the young officer and his men performed swiftly and correctly in response to the scenario instructions of the inspecting officer, and they displayed stamina and the will to win. The commander took note of this in a commendation.

Sr Lt V. Titor is constantly looking for new forms of Komsomol work. At his initiative the members of the Komsomol committee established close contact with Komsomol rayon committees and Komsomol committees of the enterprises and kolkhozes from which the men had come. A special evening event was prepared on the basis of census materials, entitled "I Am a Citizen of the Soviet Union," at which they discussed performance of military duty by representatives of the union republics and the successes of working people in implementation of the historic decisions of the 26th CPSU Congress.

I should like to stress one additional thought. In order to be fully equipped to call upon young people to engage in purposeful work and achieve high-quality performance of combat training tasks, the Komsomol activist must be familiar with the mode and attitude of Komsomol members and the state of affairs in the unit and subunit. Otherwise setbacks are inevitable. For example, lack of information on the state of affairs in the collective and lack of contact with command authorities had as a result the fact that Komsomol activist St Lt A. Malyushin was unable to awaken in young officer-indoctrinators interest in working aggressively with junior-grade aviation specialists. It seemed that sufficient measures had been conducted with the lieutenants, but in actual fact they were uninterestingly instructive. In this situation Komsomol members M. Ibragimov and A. Bachiyeu violated military discipline and the subunit helped bring up the rear in socialist competition.

There is a folk saying that fire kindles fire. The same applies to arousing positive activeness. Only a thinking Komsomol activist with initiative, utilizing diversified forms of ideological influence on people, will awaken meaningful, productive activeness on the part of Komsomol members in combat training. One must always bear this in mind in seeking to achieve implementation of the decisions of the 19th Komsomol Congress.

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## PILOT STRESSES IMPORTANCE OF MILITARY PROFESSION

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 6, Jun 83 (signed to press 4 May 83) pp 14-15

[Article, published under the heading "Marching in the Vanguard," by Maj A. Yudin: "Involvement"]

[Text] The aircraft was flying westward, gaining on the sun which was sinking toward the horizon. Rivers, forests, villages and towns swiftly receded tailward.

Capt V. Glevskiy attentively scrutinized the square fields and bends in the rivers. The land was being beautifully cared for by man. And not only here. Vladimir recalled the Ukraine, where he had been born and raised, Belorussia, where he had done a lot of flying, and Afghanistan, where he had been carrying out his internationalist duty. The Afghan valleys are particularly beautiful in the spring, when they are adorned by the crimson color of blooming poppies and tulips. He recalled the days he had spent in that friendly country.

It had been a difficult time. There had been a lot of flying, usually in adverse conditions. Glevskiy and his flying comrades were honing their professional skills far from the homeland. But they clearly understood the need for them to be in the Democratic Republic of Afghanistan and manfully accepted their share of the difficulties.

The airfield at which the Soviet subunit was based was situated near an Afghan airfield. Warm, friendly relations were established among the aviators. The Soviet pilots shared their experience and know-how in operating aircraft and the techniques of effective aircraft combat employment.

During one such get-together Glevskiy made the acquaintance of Capt Enam Ladzhvard. Enam had been in the Soviet Union and knew Russian well. Previously he had not been a professional military man. But once dushman [bandits] raided the place where his parents lived and had perpetrated a massacre. By some miracle his parents survived, and were forced to move from the provinces to Kabul. Another encounter with mercenary bandits almost cost Enam his life. The achievements of the revolution had to be defended, and he decided to become a military pilot. He subsequently became convinced again and again that his choice had been the right one. He worked hard, learning from the Soviet pilots,

grasping the secrets of professional expertise. The struggle is continuing, and only a bold, well-trained pilot can win victory.

After returning to the Soviet Union, Captain Glevskiy on numerous occasions shared with his fellow officers his impressions of the time he had spent in Afghanistan and the revolutionary changes taking place there. He thought a lot about Enam. And after such conversations, when he was alone, he also frequently thought about his own life. Two destinies, different and at the same time alike in many ways. There had been no professional military men in the Glevskiy family. But when the homeland was threatened by mortal danger, the men of the family took up weapon in hand and defended the homeland without regard for their own life. And after victory was won, they returned to civilian jobs.

Vladimir had dreamed of becoming an engineer and working at a factory. But a get-together between high-school seniors and cadets at the famed Higher Military Pilot School imeni Lenin Komsomol abruptly altered his plans for the future. They were discussing careers. Vladimir's classmates talked about civilian careers and the right freely to choose one's vocation in life. Cadets also spoke. One of them spoke enthusiastically and persuasively about the lofty honor of Soviet military men, who are entrusted with safeguarding the peaceful labor of the people.

His words struck deep into Vladimir's heart and compelled him to look differently at the life and profession of the military man. It is a difficult but very necessary profession. It was then that Glevskiy decided to enroll in flight school.

Vladimir loved military service. He found in it broad opportunities for innovative search, and he felt the joy of victories. And, most important, he felt an awareness of his involvement in the affairs of the Soviet people and the need constantly to improve his professional proficiency and to strive to attain the heights of flying skill.

This officer has accomplished a great deal toward attaining his goal. His military labor has been recognized by the award of lofty government decorations -- the Order of the Red Star, plus medals. Glevskiy rigorously appraises past achievements with his characteristic party firmness and is of the opinion that he has not yet utilized all the potential for future growth. He prepares thoroughly for each training mission, substantiates every decision with precise calculations, and studies persistently to be able to wage combat against a powerful adversary equipped with sophisticated hardware.

...The mission was still in progress. Captain Glevskiy's mission was no easy one. It involved bombing an "enemy" nuclear missile site in the face of heavy opposition by hostile air defense weapons. Executing a missile-evasion maneuver, Glevskiy successfully got past the "battle line" and approached the bombing range. Appraising the situation, he quickly determined where the missiles might be located. Naturally the "enemy" would not put a launcher out in plain view; he certainly would conceal and camouflage it.

The pilot had only a few seconds to spot the target. Those few seconds were enough. There it was, a silvery cigar-shaped missile, covered by camouflage nets. He executed a maneuver, and initiated his bombing run. Release! The bombs precisely straddled the target. He executed another maneuver, and proceeded to initiate another attack pass. He concentrated cannon fire on auxiliary equipment. Pulling out of his dive, the pilot set course for home. Some time later the bombing range officer reported the results of the mock bombing attack. They met the performance standard for a mark of excellent.

Taxiing up to the flight line, Captain Glevskiy reported mission accomplished to his commanding officer.

...The sun had dropped below the horizon. Dusk came swiftly. Off in the distance, beyond the runway lights, tractor headlights were shining -- farmers were continuing their plowing. Vladimir Glevskiy had a warm feeling deep inside: his military labor was part of the entire country's labor.

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## ECONOMIZING IN RESOURCE CONSUMPTION URGED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 6, Jun 83 (signed to press 4 May 83) pp 16-17

[Article, published under the heading "The Reader Continues the Conversation," by Maj Gen A. Zhuravlev: "Economy Is the Concern of Each"]

[Text] I carefully read the article by Lt Col V. Kroshka entitled "Has Reserve Potential Been Exhausted?" (AVIATSIYA I KOSMONAVTIKA, No 2, 1983). It addresses issues of importance not only for increasing combat readiness but also for improving personnel living conditions.

There is considerable reserve potential for economizing on resources. It was noted at the 26th CPSU Congress that what would seem to be a simple everyday thing is the core of economic policy -- a good-management attitude toward public property and the ability fully and expediently to utilize everything that we have. The initiative of workforces and military units, organizational and party work should be directed toward this. The efforts of commanders, staffs, and political agencies should be concentrated on this. Proceeding from the demands of the party, commanders and political workers are directing specialists to implement even more persistently the principles of socialist economic management and to carry out the behests of V. I. Lenin -- to keep precise and conscientious track of money, to manage economically, and to observe the very strictest labor discipline.

Issues of economy and thrift affect every officer, warrant officer, noncommissioned officer, and enlisted man. To expend raw materials and supplies in a thrifty manner, to reduce waste, and to put an end to unwarranted losses means to achieve savings in the labor of millions of Soviet citizens, to increase the national wealth of the homeland, and to concern oneself with its continued prosperity and strengthening of defense capability. Unfortunately we sometimes hear the following opinion expressed, for example: is it worthwhile to talk about a few overconsumed liters of gasoline when our country possesses such vast mineral-raw material resources?

Indeed, the USSR contains large reserves of oil, natural gas, iron ore, and other valuable raw materials. These are our national wealth, the pride of Soviet citizens. And everything which has been extracted from the earth, built by socialist industry, and produced by the workers of the agroindustrial complex should be utilized efficiently, with maximum return for society.



Our country is a large industrial power, which meets its needs with its own fuel resources. It is becoming more difficult, however, to meet growing fuel needs with each passing year, particularly since even more fuel and energy resources are required as new industrial complexes come on-line.

At the present time a mere 1 percent fuel savings enables our economy to operate for 3 or 4 days a year on economized resources. This is why the party and government consider a thrifty attitude toward fuel and energy to be a task of the greatest national importance.

At the dawn of Soviet rule V. I. Lenin stressed that each and every pood of grain and fuel is truly a sacred thing and that this is always the case for a truly Communist society. Lenin's statement has not only retained its significance up to the present day but has also taken on new meaning, for it is no secret that some people still have a user-selfish attitude toward public property and are not averse to obtaining something at the expense of the state. There have been cases, for example, where certain officer-aviators have filled their own car's gas tank with government-owned fuel at the fuel and lubricant storage tanks.

Nor are military motor transport operations being handled properly everywhere, especially during the period of flight operations. Frequently specialized vehicles arrive at the airfield long before operations begin, and the drivers leave the engines running while waiting for further instructions. And yet with proper organization of the specialist personnel and a thorough analysis of the weather situation, this can be avoided. Unfortunately empty runs are made due to irresponsibility on the part of certain officers, and as a result there is wasted vehicle operation and fuel consumption.

Lt Col V. Kroshka is correct in stressing that the principal role in the campaign for economy is played by a high sense of personal responsibility for the assigned work area. This particularly applies to officers and warrant officers. If they themselves display an example of thrift and economy, constantly teach their subordinates to have a stewardly attitude toward public property, and keep strict account of expenditure of resources, savings will occur, and excessive consumption will be eliminated.

For years now they have been intelligently doing economic work and thriftily utilizing allocated resources in the unit in which Maj F. Burtsev serves. It is a matter not only of proper expenditure of each and every ruble but also an ability to foresee and provide for everything, to plan in a thoughtful manner the movement on-stream of the most important facilities, and to approach this in an innovative manner. Many of this unit's officers possess such stewardly foresight. A fine job is being done by the commanding officer, his deputies, and the party organization. An insulated brick garage for trucks and a two-story building housing all the automotive service departments have been built here just in the last 2 or 3 years. They have set up a modern classroom for truck driver training classes, plus an airfield technical support station (PUATO) and other facilities.

One of the principles of skilled management is intelligent economy in all things. As experience indicates, even a small improvement or device developed by innovators significantly facilitates operation and maintenance of modern aviation complexes and helps improve the training process.

I have known officer M. Klevtsov for several years. He has a good many unique innovations to his credit. This innovator has been awarded 12 Exhibit of the Achievements of the USSR National Economy medals!

High marks at the NTTM-82 exhibit were given to a device, designed by a team of aviation engineers, for ultrasound inspection of engine disks, which is extensively used in aircraft servicing and maintenance. It is being beneficially used in inspecting axial and centrifugal compressors and engine turbines installed on aircraft and heat engines.

Air Forces innovators display a great deal of intelligent initiative in improving training facilities. They make unique display stands, installations, electrified diagrams, and other training aids. As a result classrooms and lecture halls are changing their countenance, and technical teaching devices are increasingly more aggressively being incorporated into the training process.

In creating the new, however, we frequently forget that one can find uses for those things which we already have available. I have repeatedly seen still usable building materials burned or scrapped. And yet some of these materials are quite usable, such as for repairing service and storage facilities.

I believe that we must increase the effectiveness of inspection and auditing activities, keep a careful watch on the expenditure of funds and material resources, step up political indoctrination work with all categories of military personnel, and develop in them a thrifty and economical attitude toward public, socialist property and an intolerance toward greed and wastefulness.

It is evident that we must more purposefully and vividly reflect the issues of savings and economy in visual agitation materials and discuss them when summarizing socialist competition results and in flight operations and tactical flight exercise critiques.

A thrifty attitude toward expenditure of fuel and energy as well as all material resources should become a law and standard governing the behavior of all military aviation personnel.

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#### GLIDERS RECOMMENDED AS ECONOMICAL PILOT TRAINING DEVICE

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 6, Jun 83 (signed to press 4 May 83) pp 18-19

[Article, published under the heading "The Reader Continues the Conversation," by V. Kazakov, member of the USSR Union of Writers: "Undeservedly Forgotten"]

[Text] V. Kazakov has devoted more than 30 years to military aviation, and subsequently civil aviation as well. He has logged 12,000 hours on a great many different aircraft. Today Vladimir Borisovich tells in his books about his comrades and raises issues of concern to aviators.

In the article "Has Reserve Potential Been Exhausted?" (AVIATSIYA I KOSMONAVTIKA, No 2, 1983), Lt Col V. Kroshka discusses a very important problem -- the search for reserve potential for economizing in resources. I believe that such potential should be sought not only in the domain of economic management but in many other areas as well, and particularly in the flight personnel training system.

I remember how in the war years pilots were trained in 6 months, and a maximum of 12 months, on the most condensed training programs. Interestingly enough, however, they displayed a high degree of professional expertise in combat and subsequently in peacetime flying. Of course it is almost impossible to teach today's cadet a mastery of the modern aircraft system in such a short time. But is everything being done to train highly-qualified pilots in a minimum length of time and at the least cost?

During the war years command, engineer, and instructor personnel at flight schools, other schools, and training subunits worked innovatively, with initiative. Many new (for a given school) methods incorporating initiative were devised, and a great many unusual simulators and technical training devices were built, totally new to the Air Forces and Civil Aviation. Also important is the fact that sport gliding and glider training were conducted on a large scale in this country in the prewar years. Most of the people entering aviation schools were trained glider pilots. Today unfortunately there are very few of these. Only a few flying clubs offer this inexpensive means of basic flight training. I feel that it is time to return to the sailplane and place it in the service of Soviet aviation.

The foreign press also attests to the usefulness of sailplane training. Experts at KLM Royal Dutch Airlines calculated that numerous crashes and damage-causing accidents were leading the company toward bankruptcy. Analyzing the causes of all such incidents, the company's board of directors decided to hire sailplane pilots. Here are the statistics: during the period of basic training 16 percent of student pilots who were not sailplane pilots washed out of flight school, while no sailplane pilots washed out. Only 27.7 percent of those who were not sailplane pilots were allowed to continue pilot training, while 90.9 percent of the sailplane pilots were allowed to continue. Persons washing out during training for being unsuited for flying included 13.3 percent of those who were not sailplane pilots, and zero percent of sailplane pilots.

Assessing the economic advantage of the new policy for the period 1951-1961, the board of directors concluded that not millions but billions of dollars had been saved to compensate for losses in past years. The interests of the company dictated a decision to finance the training of sailplane pilots.

Many military pilots who have received training in flying clubs say that a sailplane helps bring out a pilot's flying ability, helps him hone his flying technique, and teaches him a better feel for the aircraft. This is essential both on piston and on supersonic jet aircraft. In my opinion the sailplane is needed not only in DOSAAF flying clubs but also in the Air Forces and in Civil Aviation.

As is indicated by the foreign press, in France pilots flying the supersonic Mirage regularly fly sailplanes, while in the UK and certain other countries fighter pilots log one third of their flying hours in combat aircraft and two thirds in sailplanes. According to calculations made by experts, very great practical and economic benefits are derived from this.

There is no doubt about the fact that pilots amass flying experience in the air. Therefore the pilot should naturally fly as much as possible. Sailplanes will help here as well. For example, area and route familiarization flights as well as similar assignments can be performed in tandem, such as a two-seater airplane towing a two-seater sailplane. This would mean that 4 persons are receiving training simultaneously on a single flight. Obviously if this same assignment is performed with two-seater powered aircraft, two flights will be required, which means heavy expenditures of working man-hours, fuel and lubricants, not to mention wear and tear on aircraft. As practical experience has shown, in the 1950's redeployment of equipment and personnel to exercise areas with the aid of Ts-25 and Yak-14 cargo-carrying gliders was much cheaper than by transport aircraft or by rail.

I believe that a glider is an excellent training device for practicing various training tasks. The cockpits of special gliders can be fitted out identically to the cockpits of corresponding powered aircraft (transport, fighter, bomber). A pilot flying such a glider becomes accustomed in the air to the instruments, learns to distribute his attention, and achieves the required automatism in his actions. A bomber crew flying a specially equipped glider can learn to bomb from straight and level flight, a transport aircraft pilot can learn to drop paratroopers, aerial gunners can practice firing at moving targets, and the fighter pilot can become accustomed to specified formation spacings. Of

course a glider is towed at a much slower speed than a modern aircraft. But after having mastered certain exercises at slower speeds, the pilot will be able to master complex tasks on a high-speed aircraft much faster, with better quality, and less expenditure of physical and emotional effort, as well as at lower cost. I believe that glider flying, in combination with training on ground simulators, will produce maximum benefit in training future pilots.

Here is an incident from the reminiscences of a pilot from the 1930's: "...We were flying in a glider behind a powered aircraft. The shape of the glider's cockpit and the equipment it carried were exactly the same as on a powered aircraft. But instead of a motor, the glider's nose carried an electric motor with a reel for winding the tow line. The length of the line was 500 meters, and we were positioned at precisely this distance behind the towplane.

"Prepare for action!" the instructor ordered, and a few seconds later informed the pilots: 'Ready for action!'

"The towing aircraft immediately proceeded to move out of my gunsight, executing various, sometimes abrupt maneuvers. We could open 'fire' on him only from close range. In order to ensure a 'hit,' I added throttle. The electric motor proceeded to wind the tow line onto the reel, bringing the glider closer to the aircraft. It is not easy simply to follow the towing aircraft, to keep on his tail, repeating the maneuvers of the 'enemy' aircraft. How difficult it is to get him in your sights! Nevertheless I scored two hits!

"Break off attack," the instructor ordered. The airplane pilots also heard this order. It returned to straight and level flight. 'Take up echelon right,' the instructor ordered.

"Working the throttle, unreeling and reeling in the line and moving toward the side, I finally took my position in formation according to the marks on the windshield.

"Hold the leader at that angle; become accustomed to flying in formation without the aid of the mark.'

"The instructor was right: it is not easy to hold formation, especially in turbulent air; a great many flight hours are required to master this skill. And I tried very hard.

"Finally the instructor radioed the towing aircraft: 'Ready for maneuvers,' and proceeded to reel us closer to the towing aircraft. He warned: 'Watch the control surfaces closely; I am doing a slow roll....'

"The towing aircraft remained horizontal, while we slowly rolled the glider.

"Flight leader, roll together!" the instructor ordered.

"Now we executed the roll together with the towing aircraft.

"In the 30 minutes spent in the practice area, we executed a great many maneuvers and accomplished a rather complicated flight assignment. Unhooking

from the tow plane, I gauged and executed an 'engine-out' landing. I got a mark of good...."

I have related this incident in order to stress once again: the tow plane and glider spent 30 minutes in the practice area, and two pilots gained piloting skill simultaneously. But their practice time was cut in half, with one third less consumption of fuel and lubricants.

I can see a chain of economical pilot training: hang glider -- glider -- airplane. This idea is not new. The majority of outstanding pilots in the Great Patriotic War, including thrice Hero of the Soviet Union Mar Avn A. Pokryshkin, came into combat aviation from gliders. And if you leaf through the old log book of a pilot who is a former glider pilot, you will see that he quickly mastered operation of his combat aircraft and was able to solo any type of aircraft, utilizing only a portion of the dual time specified by the program.

We once again thought of the glider when discussing with polar explorer friends the cost of equipment and hauling supplies to drifting ice stations. A glider can be modified in advance to serve as living quarters, a laboratory, radio shack, or medical aid station. It is no difficult task to remove the wings and secure down the entire structure after landing on an ice floe. And a prefabricated structure is much more comfortable and convenient for polar researchers than tents.

I have touched upon only a small part of the problem in my reflections, for which I do not claim solid corroboration. I have merely attempted to revive an old idea in connection with the appeal issued by the 26th CPSU Congress: "The economy should be economical." In addition, our young people need the sport of soaring. A sailplane is cheap, economical, and contains great potential for developing rudimentary flying skills; it is essentially a unique sieve, which screens out those who by reason of health and level of knowledge are qualified for flight school but who for other reasons are not capable of flying a modern aircraft. It seems to me that the sailplane has been undeservedly forgotten, and there is a patent shortage of flying clubs which give sailplane instruction.

I should like to hear opinions on this question by commanders, educators and, of course, pilots.

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#### HAZARDOUS CENTER OF GRAVITY SHIFT ANALYZED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 6, Jun 83 (signed to press 4 May 83) pp 19-20

[Article, published under the heading "Practical Aerodynamics for the Pilot," by Engr-Lt Cols I. Mel'nik and Yu. Loginov: "If the Center of Gravity Has Shifted Toward the Tail"]

[Text] The bomber lifted off the runway and commenced its climbout. Turning to the designated heading, the pilot leveled out at the designated cruising altitude.

Sixteen minutes into the flight, the pilot noticed that the aircraft was behaving strangely on the pitch axis. Although no force was being applied to the controls, the aircraft's nose was steadily rising, spontaneously increasing the angle of attack and the normal load factor. Applying forward pressure to the controls, the pilot brought the load factor back, but some time later the bomber again spontaneously pitched up. Once again the pilot had to push the controls forward to maintain level flight. The flight proceeded with gradual fluctuations in pitch angle; the aircraft's tendency toward spontaneous increase in normal load factor was becoming greater, and the pilot was pushing the controls further and further forward in order to maintain level flight.

Analyzing the aircraft's behavior, the pilot noticed that the control-wheel column was much further forward than usual in level flight. He suddenly realized that the aircraft's center of gravity had shifted tailward. He glanced at the fuel gauge: the needles indicated that there was almost twice as much fuel in the rear tanks as in the forward group. The pilot immediately reported the situation to the flight operations officer and received permission to abort the mission and return to base.

It was becoming increasingly more difficult to control the bomber. The aircraft kept trying to raise its nose and increase the normal load factor, which began to drop after the control wheel was pushed forward, but not to 1, but rather to a substantially smaller value (0.35-0.4). In order to prevent a further decrease, the pilot pulled back somewhat on the controls, and the load factor once again increased, reaching values greater than 1.



The on-board flight recorder registered smooth pitch oscillations with a period of 15-20 seconds and a load factor fluctuation amplitude of 1 (from 0.35 to 1.35). It became obvious that the aircraft's center of gravity had not simply displaced tailward and gone out of the weight and balance envelope but had moved even further rearward than neutral. It is difficult to control an aircraft in these circumstances, since it responds to the slightest external disturbance with a spontaneous change in angle of attack. In this case the control wheel was close to full forward, and there was a real danger of a complete loss of aircraft pitch controllability.

In order to bring the center of gravity back into the weight and balance envelope or at least to the most rearward allowable position, the commander decided to dump some of the fuel from the rear group of tanks. This made it easier to fly the plane, but the control-wheel column neutral position was still further forward than normal for level flight. There still was a difference of about two and a half tons in fuel quantity between the forward and rear tank groups.

In order to equalize the fuel weight, the flight operations officer instructed the crew to switch both engines over to the rear tanks.

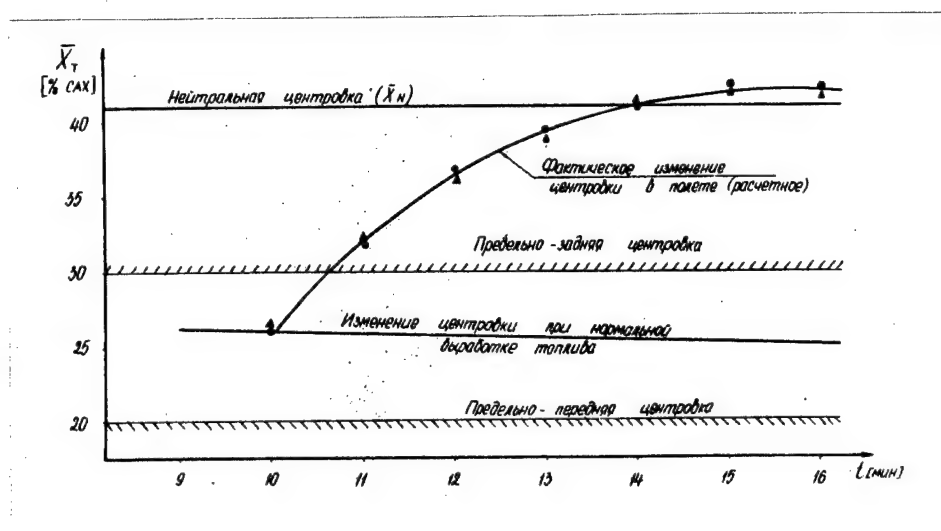
When the fuel weight difference between the tank groups was a ton and a half, the aircraft was permitted to initiate a landing approach. As the aircraft proceeded, the difference in fuel quantity between rear and forward tanks continued to decrease, and did not exceed half a ton at the moment of touchdown. The aircraft once again became controllable, and the pilot was able to land without any difficulty.

The technical maintenance unit thoroughly inspected the aircraft's fuel system. The specialists determined that the center of gravity had shifted in flight due to a fuel leak from the number two tank.

An analysis of the flight recorder data established that up to 10 minutes into the flight, the neutral positions of the control wheel and stabilizer were normal for the flight configuration. They were determined on the basis of mathematical relations, one of which is contained in Figure 1 on the back cover [not reproduced].

In the technical description stabilizer trim positions are always given relative to mean aerodynamic chord (MAC), while deflection angles are usually recorded on that aircraft relative to its longitudinal axis. This fact sometimes causes even experienced specialists to err. Therefore, in order to determine the stabilizer's position relative to the MAC, it is necessary to add the wing angle of incidence to the determined stabilizer deflection angle.

Ten minutes into the flight, the in-trim position of the control wheel and stabilizer, as indicated by the flight recorder, began to change appreciably. In order to determine the actual change in center of gravity, they analyzed the record of the stabilizer position during this segment of the flight (Figure 2 on back cover) [not reproduced]. Two methods were employed for calculation. The first, simpler method consists in using a curve of additional stabilizer



### Results of Calculation of Actual Change in Center of Gravity During Flight

Key:

1. Neutral
2. Actual change in center of gravity during flight (calculated)
3. Maximum allowable rearward center of gravity
4. Change in center of gravity with normal fuel consumption configuration
5. Maximum allowable forward center of gravity

● -- points obtained when calculating center of gravity by the first method  
 ▲ -- points obtained when calculating center of gravity by the second method

deflection ( $\varphi_{cr}^{\bar{X}_T}$ ) with a change in aircraft center of gravity ( $\Delta\bar{X}_T$ ) by  $\pm 1$  percent MAC (Figure 3 on the back cover) [not reproduced]. To accomplish this, one arbitrarily selects time intervals of from 10 to 60 seconds on the flight recorder tapes, depending on the rate of stabilizer retrimming, with aircraft center of gravity determined at these intervals. It is best for flight to be steady-state at the computation points, with a normal load factor of 1. Then at the selected time we find the stabilizer trim deflection in the given flight conditions with the relations contained in Figure 1. Then, from the flight recorder readings for that moment, we determine actual stabilizer deflection ( $\varphi\phi$ ).

We calculate the difference between trimmed and actual stabilizer positions with the following formula:

$$\Delta\varphi_{cr} = \varphi\phi - \varphi_{бал}$$

From the graph (Figure 3 on back of cover) [not reproduced] we determine additional stabilizer deflection with a change in the aircraft's center of gravity

by 1 percent MAC in the given flight conditions ( $\bar{\phi}_{cr}^{\bar{X}_T}$ ). The deviation between actual and normal center of gravity for each computation point in time is determined with the formula:

$$\Delta \bar{X}_T = \frac{\Delta \bar{\phi}_{cr}}{\bar{\phi}_{cr}^{\bar{X}_T}}.$$

We then calculate the actual change in aircraft center of gravity in flight ( $\bar{X}_T \cdot \Phi$ ). For this we add the amounts of deviations of actual center of gravity from normal ( $\Delta \bar{X}_T$ ) at the reading points to the center of gravity values caused by consumption of fuel ( $\bar{X}_T$ ):

$$\bar{X}_{T\cdot\Phi} = \bar{X}_T + \Delta \bar{X}_T.$$

After this, we plot on the graph of change of parameters in flight the normal change in the aircraft's center of gravity, which should be caused by automatic fuel consumption, and its actual change.

If the technical description lacks the curve  $\bar{\phi}_{cr}^{\bar{X}_T} = f(M \text{ and } N)$ , contained in Figure 3 on the back cover, actual change in center of gravity according to stabilizer position during flight can be determined with the aid of aircraft lift coefficient  $C_y$  (second method). The calculations are performed as in the first method. But for each computed moment we determine coefficient

$$C_y: C_y = \frac{2Gn_y}{\rho V^2 S},$$

and then calculate deviation between actual and normal aircraft center of gravity:

$$\Delta \bar{X}_T = - \frac{\Delta \bar{\phi}_{cr} m_z^{\bar{\phi}_{cr}}}{C_y} \cdot 100\%.$$

For the case in question, the results of calculation of actual change in the center of gravity on that segment of the flight during which fuel was leaking from the number two tank into the atmosphere are shown in the accompanying figure.

An aircraft's static load factor stability is determined by the mutual placement of the aircraft's center of gravity and its aerodynamic center. The margin of stability is determined by the difference of the coordinates of their positions ( $\bar{X}_T - \bar{X}_F$ ), expressed in fractions of MAC. Numerically it is equal to the derivative of the pitching moment coefficient against the lift coefficient ( $m_z^{\bar{X}_T - \bar{X}_F} = \bar{X}_T - \bar{X}_F$ ).

With center of gravity positioned forward of the aerodynamic center ( $\bar{X}_T - \bar{X}_F < 0$ ), the aircraft is load stable, when they coincide ( $\bar{X}_T - \bar{X}_F = 0$ ) it is neutral, and when the center of gravity is to the rear of the aerodynamic center ( $\bar{X}_T - \bar{X}_F > 0$ ), the aircraft is load-factor unstable. Since  $\bar{X}_T - \bar{X}_F = m_z^{\bar{X}_T - \bar{X}_F} C_y$ , one can judge load-factor stability by the sign of  $m_z^{\bar{X}_T - \bar{X}_F} C_y$ , by the slope of the pitching-moment coefficient-lift coefficient curve  $m_z = f(C_y)$ . Figure 4 on the back cover shows the  $m_z - C_y$  relations of a load-factor stable, neutral, and unstable aircraft. In a stable aircraft, with a random increase in  $C_y$  (angle of attack), from value  $C_{y1}$

to  $C_{y2}$ , there will appear negative moment  $\Delta M_z = -\Delta m_z g S l$  toward decrease in  $C_y$  -- the aircraft will return to the original configuration. In the case of an unstable aircraft, with the same increase in  $C_y$  there will appear an additional nose-up moment  $\Delta M_z = \Delta m_z g S l$ , and the angle of attack will increase at an accelerating rate. If the pilot is late in deflecting the stabilizer to counter the increasing angle of attack, the aircraft may reach critical angles and stall.

Analysis of development of the hazardous air situation reconfirmed how important flight-recorded information is. In this case flight recorder information made it possible to determine the time, rate and amount of aircraft center of gravity drift, to estimate the aircraft's stability and controllability, as well as the crew's response to the situation. Information provided by on-board flight recorders makes it possible thoroughly to analyze the operating capability of the aircraft, flight conditions, and to evaluate crew observance of safe operating procedures.

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## IMPORTANCE OF PILOT COMBINED VISUAL, INSTRUMENT ORIENTATION STRESSED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 6, Jun 83 (signed to press 4 May 83) p 26

[Article, published under the heading "Constant Attention to Flight Safety," by Honored Military Pilot USSR Lt Gen Avn N. Kryukov and Candidate of Psychological Sciences and Docent Engr-Col M. Kremen': "By the Method of Reference Points" (first of two parts)]

[Text] In 1976-1977 a major discussion on the representation of flight was held on the pages of the journal AVIATSIYA I KOSMONAVTIKA. The discussion showed that it was very important to investigate questions connected with forming a representation of flight, to find and scientifically substantiate more efficient methodological techniques of training flight personnel. Increasing the capabilities of air warriors in spatial orientation, the quality of piloting an airplane (helicopter) and, on this basis, improving safety of flight operations continues to be of great importance.

The high degree of sophistication of modern aircraft equipment, including control systems and instrumentation, alongside expanded capabilities of utilization of fixed-wing and rotary-wing aircraft, has also caused specific changes in the pilot's activities. Let us take, for example, flying an airplane (helicopter) on instruments in VFR weather. In our opinion this is not always dictated by necessity and in a number of instances involves the pilot's inability to fly visually.

Inadequate visual observation is due to the fact that the pilot is work-loaded with collection and processing of information from the gauges as he flies. And the teaching methods presently in use sometimes fail to foster development in the pilot of the ability to combine in a maximally expedient manner instrument and noninstrument (position of the horizon, the plane of the earth, acceleration, G-load, vibrations, forces on the controls, etc) information.

We shall recall that in the past basic flight training involved flying almost entirely on the basis of utilization of natural visual reference points. The authors of books on methodology (V. Sychev, 1950; G. Golubev, 1953) stressed that direct perception of an aircraft's maneuvers in relation to the horizon and earth surface helps form an idea about the attitude and position the aircraft is about to enter, helps anticipate the aircraft's movements, and thus ensures precise flying. Of course there have taken place certain objective

changes in the conditions of in-flight activity. In addition, a number of other factors have made it necessary to teach pilots to fly in a ground simulator.

In our opinion the point is that to fly an aircraft with precision, let us say, it is necessary to use instrument information even in conditions of good visibility. When flying at low altitude, for example, the pilot spends a large part of his time reading the instruments, which of course does some detriment to exterior visual observation. We should state at the outset that when flying at extremely low level, as a rule a pilot devotes more attention to visual observation of the ground and ground obstacles than to his instruments, and this is correct, since it more reliably guarantees flight safety.

Intensive development of theory and methodology of pilot labor in the 1960's and 1970's enables us to bolster with scientific validation those old training materials which were based on intuition and the wealth of experience of methods specialists and which gave us a firm foundation for forming a representation of flight and such components as the feeling of the airplane (helicopter) and an idea of one's position in space. Synthesis of instrument and noninstrument information during training helps form a superior representation of flight.

In our opinion the latter is a psychological system which provides regulation of a pilot's actions. It is the pilot's concept of needed and current space-time states of the aircraft and its systems, which is formed on a foundation of experience, knowledge, skills, ability, and the influence of all sources of information. Thanks to representation of flight, the pilot always has an idea of the spatial attitude of the aircraft and controls it even with discrete or incomplete information input and insufficient time.

During the entire process of preparing a cadet for taking to the air -- in classrooms, laboratories, simulators and at the airfield, utilizing technical teaching devices, aircraft models, diagrams, posters, and other visual aids, he forms a general standard representation of flight, as it were. It is this picture which defines the program of action and volume of data needed at each given moment. And this releases time for circumspection, to assess the air and navigation situation, and to perform combat training tasks. In performing a specific task on the basis of incoming information, both instrument and noninstrument, a pilot forms a current representation of flight. As a result of comparing the standard and current pictures, a stable program of control actions is created, which is in conformity with the situation.

What are the possible ways to achieve active, purposeful forming of a picture of flight? We set for ourselves the task of finding a teaching method which would enable us to release time for perceiving visual noninstrument information on the aircraft's position in space. We suggest a method of using reference points as a technique promoting successful accomplishment of this task. We define reference point as a limited space-time region on a given flight trajectory, in which there takes place a typical change of dominant parameters according to a specific program.

Selection of reference points, their number and place on flight trajectories possessing continuous curvature is determined by the character of change in

G-load, angles of attack and pitch, and in trajectories containing linear segments -- pitch angle or commencement of change in flight configuration. In some instances this selection is dictated by a necessary action (cutting in and shutting off afterburners, lowering and raising flaps, landing gear, etc) pertaining to control of the aircraft or using aircraft systems. Each reference point is fixed in the flight trajectory (maneuver) and is characterized by the following attributes: parameters which determine the commencement of entry into a maneuver or exit from it; by the commencement or termination of a steady-state value of a dominant flight parameter; by the commencement of transition of the nature of change in the dominant flight parameter (from decrease to increase and vice versa); by the position of the most typical reference points.

Reference points determine the sequence of acquisition of instrument and noninstrument information from the order and arrangement of flight parameters and their significance for determining the aircraft's position in space and the need for a control action. The method of studying and using reference points makes it possible to optimize the structure of information both at and between reference points. And we believe that this serves as a reliable basis for forming a current flight representation.

One of our higher military aviation pilot schools has conducted an experimental investigation of the expediency of study on the basis of using reference points. It involved two stages: the first stage covered ground training, and the second stage covered cadet flight training, involving execution of a 60 degree banked turn, a chandelle, and turn onto base leg, flying L-29 and MiG-21 aircraft. We shall examine primarily this stage in the concluding part of this article. (To be concluded)

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## DANGEROUS, ACCIDENT-THREATENING STUDENT PILOT "HOTDOGGING" CONDEMNED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 6, Jun 83 (signed to press 4 May 83) p 27

[Article, published under the heading "Analyzing an Accident Cause," by military pilot 1st class Col F. Akchurin: "'Good' Intentions"]

[Text] My duties frequently involve checking the proficiency of flight personnel. I must frankly admit that I feel a special sense of satisfaction when an air warrior is conscientious in things large and small in performance of a task and never violates the rules and regulations governing flight operations. Practical experience indicates that precisely such officers (and they comprise a majority) are more successful in their endeavors. They more rapidly reach the heights of professional expertise, more confidently carry out the commander's duty as a teacher and indoctrinator, and enjoy great respect by their superiors and subordinates. As a rule these officers are highly-proficient air warriors and advance their subunits into the vanguard on the basis of training performance and socialist competition results. Of course the activities of each of them include a great many unique features, engendered by experience and innovative quest. But organization, efficiency, and composure are characteristic of all of them.

I have known Capt Yu. Orekhov for a long time. I flew dual with him on numerous occasions, checking his performance in piloting, cross-country flying, and instrument flying under the hood. And this officer always displayed exquisite flying and navigating technique, high-grade expertise, as they say.

What is behind such constancy? Inborn talent? Perhaps natural talent does play a certain role. But I shall not err in stating that this captain became a true pilot through hard, systematic work, and discipline, which has become an important character trait in him.

I have seen on numerous occasions how diligently and conscientiously Orekhov prepares prior to going up. Regardless of how many times he has done it before, and independent of the difficulty of an assigned mission, preparation is always complete, detailed, and there are no miscalculations whatsoever in his preflight planning. Once in the air, this pilot precisely follows the plan approved by his commanding officer. He flies the aircraft aggressively, but strictly according to regulations, keeping within operating restrictions.

I had heard Orekhov's superiors say that in spite of his thorough knowledge and high degree of skill, this pilot regularly put in simulator time. They also said that he appraised his own personal successes in a frank and self-critical manner, that he was attentive to the comments and advice of superiors and others in his unit, and that he worked hard and persistently to correct errors. This pilot made several valuable suggestions which helped improve the training process. This indicates his dedication to his job.

When I think about such air warriors as Orekhov, I involuntarily recall words from the Central Committee Accountability Report to the 26th CPSU Congress: "The objective is to develop a work style which organically combines efficiency and discipline with bold initiative and enterprise, practicality and a business-like attitude with a striving toward high goals." These words also fully apply to us military aviators. Indeed, can one even consider effective, high-quality accomplishment of combat training missions if a pilot, navigator, or aviation specialist lacks composure and departs from established rules and procedures? Of course not! A high degree of combat readiness and excellent flying proficiency are simply incompatible with the slightest lack of discipline, dulling of vigilance, and particularly willfulness, slackness, and carelessness.

But in the real world such things do still occur. On instructions by my superiors, I frequently analyze flight personnel errors and actions which can lead to air mishaps. They happen for various reasons: due to the inexperience or inadequate moral-psychological preflight preparation by a pilot or student, poor skills on the part of those who taught them, etc. It is of course annoying, but one encounters errors in methodology. Without excusing or justifying the guilty parties, however, such errors of omission are understandable: difficulties in mastering new equipment and more complex kinds of flight training are logical; everything does not come as easily as one would wish. In addition, in my opinion growing pains are overcome relatively rapidly with diligence and persistence in training.

Much greater harm is done by those errors and dangerous actions caused solely by a pilot's lack of discipline and violation of rules and regulations.

...The fighter taxied to the centralized fueling station. As per procedure, the ground maintenance technician asked the pilot if there had been any problems.

"No," replied Capt V. Davydov. "Everything is fine."

The pilot's words did not dull the ground technician's vigilance: he proceeded conscientiously in readying the aircraft for its next flight. And he discovered damage on the jet nozzle. The officer immediately reported the problem.

It seems that in the practice area Captain Davydov had throttled the engine up to a higher power setting than the mission called for. Justifying his actions, the pilot said: "I wanted to see what the fighter could do."

Such "curiosity," to put it mildly, cost the subunit dearly. The aircraft was pulled off the line right in the middle of flight operations, and those who were

scheduled to go out in it failed to move forward in the program. We should also note that the state was forced to sustain considerable expense due to unnecessary premature engine replacement.

Captain Davydov received disciplinary punishment, and the party organization also reprimanded him. But it would have been more useful to prevent such an unpleasant occurrence. This required better, more purposeful, to-the-point indoctrination work in this pilot's subunit.

Practical experience indicates that errors of omission on the job result in violations of rules and regulations. Here is an example.

Flight operations were in progress in the aviation training regiment. Most of the graduating students received high marks for flying performance in the practice area. But then evaluation team specialists processed flight recorder film carrying a record of the mission performed by cadet V. Gaur. The flight recorder indicated that this future pilot has taken two rolls too many. This fact was immediately reported to the flight operations officer. The officer acted with decisiveness: he immediately grounded Gaur, reported the incident to everybody on the flight line, and demanded that they not violate the rules. Subsequently the cadet was severely punished. It would seem that the matter is finished, but I do not want it to lie. And here is why.

Explaining his actions, Gaur attempted to justify them by claiming "good" intentions: he claimed that he was trying to improve his roll execution technique. Strange as it may seem, other cadets sympathized with their comrade who had failed to follow their superiors' instructions. "What is so bad about him loving to fly, having a little fun?" they reasoned.

Empty arguments! There was only one correct procedure for the cadet to follow in order to practice the maneuver: he should have asked his instructor to go with him on a check ride or give him another trip into the practice area to work on it. A person about to receive his officer's commission should know this.

Attempts to justify a violation of military and flight discipline with "he loves to fly," "he got carried away," and "no mishap took place" clearly indicate that in officer candidate Gaur's subunit they did a poor job of developing efficiency and a sense of responsibility for excellent training performance in the future pilots. A need to act at all times and in all things according to the dictates of the laws of the sky must be instilled from one's student flying days. There can be no other road to success.

The great majority of pilots act in all circumstances in conformity with rules and regulations and as ordered by their superiors. They should be set up as an example. And those who violate rules and regulations should be severely censured. Then there will be no gross errors and dangerous, potential accident-causing actions arising from so-called "good" intentions.

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## SLOPPY AIR-GROUND RADIO COMMUNICATIONS CRITICIZED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 6, Jun 83 (signed to press 4 May 83) pp 28-29

[Article, published under the heading "Constant Attention to Flight Safety," by Lt Col (Res) D. Rozhkov: "Word Over the Radio"]

[Text] The night flight operations were proceeding smoothly. For the most part these were novice pilots. Novice pilots fly their first solo training flights pretty much as instructed. They do as they were taught.

...A jet engine roared to life on the flight line, and after some time the fighter proceeded to taxi out to the active.

"Why is he dawdling? He's behind schedule!" the flight operations officer growled in an irritated voice to the duty GCI controller.

"630, buttoned up and ready to roll!" a voice came on the control tower speaker.

"630, move it to the active! Quit dawdling!" the tower controller responded.

A minute later the fighter began its takeoff roll. Scrutinizing the aircraft, the flight operations officer noted that the pilot had forgotten to switch on his navigation lights. The irritation caused by the young officer's dawdling and his carelessness grew more intense. When the pilot reported: "630 clear," the flight operations officer angrily shouted over the radio: "630, check your navigation lights!"

Everybody who was watching the departing aircraft from the ground saw a most unusual sight. The afterburner glow, a bright flame in the night sky, suddenly seemed to freeze in place, and then began dropping rapidly. A few seconds later an explosion was heard....

What had happened? It seems at the very moment when the tower controller instructed the pilot to check his navigation lights, another pilot abruptly proceeded to transmit on the tower frequency, and the departing pilot thought he heard the following command: "630, eject!"

As a result of the two voices transmitting simultaneously, the pilot abandoned a perfectly good aircraft.

The team which investigated the accident determined the guilty parties. The investigators took every factor into account: the degree of training of the young officer, his nervousness on his first night operations, and the tower controller's actions.

This incident took place quite some time ago, but they still frequently talk about it at the field. It shows once more why it is essential to have a very serious and responsible attitude toward radio communications. The prescribed radio communications rules and procedures must be followed to the letter. A word spoken over the radio carries information which the person to whom it is addressed must receive, understand, reach a decision, and reply. Successful performance of a mission, and frequently flight operations safety as well, depend in large measure on precise, efficient radio communications.

What demands are placed on optimal radio communications? First and foremost, the strictest radio exchange discipline, brevity, clarity, efficiency and, of course, courtesy.

"121 cleared for takeoff!"

"121, roger!"

Not one superfluous word. Such commands take up minimal air time. And this is very important today, with air traffic so congested. And it is not mere happenstance that Air Force units devote special attention to correct radio procedures.

And take such an item as courtesy. Practical experience shows that lack of courtesy, and to an even greater extent outright rudeness have a negative effect on the emotional state of a pilot, especially a young and inexperienced pilot, sometimes unsettling him. Commanders know this, but sometimes you hear them say: "A pilot is not a young lady, but a warrior. It's not so bad if you shout at him."

As experience attests, such an opinion is dead wrong. I shall cite an example. A young pilot had performed a training assignment in the practice area and was returning to the field in a good mood. On his landing approach he was late in throttling back after turning final and was coming in a bit hot. Wishing to correct his mistake and complete the flight with a good landing, he took a go-around. There was no problem, no harm done. In this case the tower controller should have showed maximum attention to the novice pilot, giving him the necessary landing instructions calmly and kindly. He did otherwise, however: he angrily chewed out the lieutenant as he proceeded with the go-around. The result was immediate. The pilot became nervous; it seemed to him that the procedures he had in the past performed cleanly were now a bit ragged. He had to go around again. He finally made a bad landing on his last kilograms of fuel.

Such things should not happen. There is no place for rudeness over the radio. Unfortunately some people do not understand this. Sometimes officers fail to attach proper importance to such phenomena and fail to hold fully to account members of the flight operations team for tactlessness.

As a rule an experienced flight operations officer is quite familiar with the pilots flying on a given operations shift, with their personalities and temperament. He knows how each will conduct himself in a given situation. In conformity with this, he will speak calmly to one pilot and energetically and in no uncertain terms to another, knowing that this tone will nudge him to immediate action. But in any case he works specifically and to the point, but without hurting anybody's feelings.

Of course it would be erroneous to state that radio communications discipline depends only on the ground end. It is determined by the actions of each and every individual involved in the ground-air communications system. There is a firm rule in aviation: before keying the microphone, check to make sure the air is clear. Is this rule always observed? Unfortunately, it is not. Sometimes the speakers on the ground carry a crackling sound and emit fragments of incomprehensible phrases and constantly repeated inquiries.... But perhaps at this very moment some aircrew needs immediate ground assistance.

Lt G. Solov'yev was returning to the field from a training mission. The tower controller instructed him to enter the holding pattern at 800 meters. All the aircraft's instruments and systems were working perfectly, there was little radio traffic, and nothing was hindering the pilot from acknowledging the instructions. But he failed to do so. His reasoning was as follows: why waste conversation? There is no interfering radio conversation, so how could one not understand the instructions? But the tower needed confirmation that the pilot understood the instructions: other aircraft were approaching the field. The tower controller again called the pilot, but another voice cutting in made the controller's message incomprehensible. But time was running out, and all holding altitudes in the pattern were occupied except for 800 meters. What if the pilot entered at a different altitude?

It was only after the tower's third attempt to contact Solov'yev that his voice was heard in the speaker: "Roger, I understand. This is 202, enter holding pattern at altitude of 800 meters."

This long reply took up an additional several seconds. It would have been much simpler for the pilot to say: "202, roger, 800!" No more is needed! And no unnecessary problems caused to the tower controller or other aircraft approaching the field.

Radio communications discipline not only calls for brevity in calling and responding, but also requires completeness and reliability of information and a radio message compressed into a few words. Otherwise an air traffic controller, seeking to make sure that the aircraft fully understands the instructions, will be forced to ask the pilot to repeat, wasting time and clogging the radio channel. Before making initial radio contact, the pilot should analyze the developing situation. A great deal here depends on the persons who are responsible for flight operations safety. A poorly trained officer not only

will not help an aircraft in a difficult situation but may even add further to the confusion.

An enormous amount of information is received by the tower in a short period of time. It must be intelligently evaluated, interpreted, a correct decision made, and that decision communicated to the aircraft concisely, clearly and comprehensibly. This demands a high degree of technical and psychological training on the part of air traffic controllers and professional expertise on the part of pilots. As experience shows, such specialists quickly establish necessary contact with aircrews and maintain a high degree of radio communications discipline. This helps conduct flight operations without air mishaps and near-accident situations. If radio communications are correctly utilized, they help achieve highly-organized flight operations, precise coordination between the ground and aircraft in the air, and guarantee air traffic safety.

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## MANNED SPACE MISSION MEDICAL SUPPORT DESCRIBED

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[Article, published under the heading "Space Mission Support," by Doctor of Medical Sciences I. Pestov: "Constituents of Success"]

[Text] On the occasion of the 211-day mission flown by A. Berezovoy and V. Lebedev, USSR Academy of Sciences President A. Aleksandrov stated: "The medical-biological aspects of this extended space flight are of enormous value...." We asked USSR State Prize recipient Doctor of Medical Sciences I. Pestov to discuss pertinent problems of medical support activities for extended missions in space.

In medical support activities for extended manned missions in space, great importance is attached to formulating medical forecasts as well as managing the physical condition of crew members and their habitation environment.

What data did science possess toward the end of the first decade of the space age, when an 18-day record was set for length of a manned orbital mission? Available data gave cause for concern. Weightlessness caused perceptible physiological problems, which cosmonauts manifested both early in a mission, when their system had not yet adapted to the new conditions, and after their return to earth. The insidious consequences of adaptation to a condition of weightlessness were clearly revealed. Adaptation was achieved at the cost of loss of properties and qualities essential to withstand the effect of terrestrial gravity. Diminished capability to remain in a vertical position, diminished resistance to physical stress, as well as impairment of coordination of movements and a number of other changes following 18 days in space created the impression that a "ceiling" had been reached as regards safe allowable duration of manned space missions.

In order to put these fears to rest and to continue the forward advance of space exploration, it was necessary to gain an understanding of the nature of these changes, the nature and causes of subsequent changes in the structure and functions of the organism, their reversibility, and the possibility of adjusting the cosmonauts' physiological state with the aid of preventive measures, treatment, and other control influences. All these problems had to be resolved

in advance, prior to the time extended missions on board orbital space stations became practicable.

Research and study of this problem began in this country in the middle of the 1960's, when extended missions were still a thing of the future. It was established that restriction of mobility and uniform distribution of blood relative to the body's longitudinal axis in conditions of bed confinement reproduce many reactions which are qualitatively analogous to those which occur in humans in a state of weightlessness. And although this model was of course not a complete analogue of weightlessness, it offered the only opportunity to look beyond the limits of the actually achieved duration of manned missions.

Incidentally, predictions based on the results of such indirect observations were brilliantly confirmed by the results of direct investigations conducted on space missions of increasing duration. A vast volume of laboratory research, in conditions of simulating weightlessness, running from a few hours and days to many months, was needed, to be true, in order to achieve the requisite completeness of knowledge. Virtually each and every new step forward in the conquest of space relied on the results of these studies. The reactions of diversified functions and systems of the human organism were studied in detail, principal cause-and-effect linkages were established, and the possibilities and effectiveness of adjusting man's physiological state with the aid of an aggregate of preventive measures were determined. In other words, the requisite preconditions were created for controlling the physiological state of cosmonauts on actual manned missions.

Control is not a medical term. It is used in technology, information theory, and is specific to cybernetics (science of control), where a thesis was formulated to the effect that a system, when deprived of control information, tends to diminish the level of its organization, moving toward chaos. This thesis is universal and applicable to technical, biological, and even to social phenomena.

On a space flight man is limited in satisfying a number of requirements and is deprived of gravity, which is an important organizing factor. Therefore conditions of space flight are equivalent to partial loss of control information. The properties and qualities of the human organism, which are a result of evolution and individual experience in the struggle against gravity and are embodied in the specific features of the structure and function of the organism, are gradually lost in conditions of weightlessness. The consequences of other restrictions are also potentially adverse. Tendencies toward decline in the level of organization of man's system in these conditions should be countered by an aggregate of control influences.

We are familiar with control systems of two types: closed (based on feedback), and open (based on execution of program input). Both principles are applied in medical support of extended space flights.

Securement of conditions for vital activities, forming of a habitable environment, work, rest, meal and physical training regimen are accomplished taking into consideration medical, physiological-hygienic and psychophysiological standards incorporated into programs governing the functioning of the corresponding on-board systems. The physiological state, subjective physical well-being, and

work efficiency of a spacecraft crew depend to a considerable degree on how correct were the program input data, whether the program is sufficiently universal in application, and whether it covers the variations of individual features of the organism of the various cosmonauts. The program of employment of means and methods of preventing the adverse effects of weightlessness on the human organism, for example, was formulated so as to achieve the desired effect on any cosmonaut.

Mission programs mandatorily include the most general medical requirements which ensure guarding the health, restoring the energy, and maintaining the work efficiency of cosmonauts, whatever their individual peculiarities may be. Experience has shown that precise observance of the principles of program control is an important condition for the safety and effectiveness of manned missions, while any departure from the program is fraught with the possibility of occurrence of uncontrollable situations.

In medical support of manned missions, program control is combined with methods based on analysis of feedback information. Taking account of information received from the crew in the form of verbal messages, telemetry data, data on behavior and activities, as well as information characterizing the state of on-board life support systems provides a foundation for making decisions on applying corrective measures.

Problems of forecasting and management are also closely interwoven in this domain. For example, it is essential to discover in advance (before it becomes dangerous) signs of deterioration of fitness in cosmonauts, decline of functional reserves, and resistance to stress effects in order to introduce changes in a prompt and timely manner into elements of the mission program or to give recommendations to the crew. Functional tests with measured loads, such as physical stress loads, help accomplish this task on a manned mission.

One can arrive at far-reaching conclusions from changes in reactions to these tests, determining the nature, directional thrust, and dynamics of functional changes, that is, one can formulate a prognosis. It is of practical importance, for example, to have information available prior to completion of a manned mission on how the cosmonauts will stand up to the return to gravity. We determined that devices which hermetically seal off the lower half of the body from the atmosphere, when a partial vacuum is created in them, reproduce in a person reactions which are typical for a person assuming a vertical body position on earth. This furnishes valuable information on the need for appropriate preventive measures to increase cosmonauts' ability to tolerate terrestrial conditions.

At the same time utilization in space medicine of the control principles inherent in closed systems of feedback has its specific peculiarities and limitations. This is due to the incomparably greater complexity of man as a controlled object in comparison with any machine. In contrast to a machine, which can be adapted in advance to space flight and the properties of which are standard, stable, and with a known service life, and with operating conditions prescribed, man is not specially adapted to space flight, is individual, his properties are subject to changes, his service life is not known, and operating conditions are adjusted subjectively. While monitoring of the state of a

machine is possible with any desired degree of detail in the form of objective data and criteria compared with standard figures, remote monitoring of humans is possible only at the level of certain systems, functions, and subjective reactions; evaluation of fitness for work and comparison with standard figures are difficult, and self-monitoring has been developed. A machine's reaction to control influence is stereotypical, reproducible, and conforms to calculation, while in humans it can change under the influence of objective or subjective factors.

Man can be viewed as a system the behavior of which is determined both by internal laws of development and by external control influences. The latter are effected by the natural or social environment with the aid of control signals. Possessing intellect, freedom of volition, his own life experience and goals, man can react in more than one way to external control signals, execution of which can be adjusted by one's own point of view, subjective evaluation criteria, or can be replaced entirely by the mechanism of self-government.

By virtue of these specific features of man, there occurs diminished reliability of functioning of all links in the chain of control signal formation, passage, and execution, while reliability of feedback information on a cosmonaut's current state cannot always be acknowledged as absolute. We must also consider the widespread opinion that sometimes it is more apparent to an individual himself what is useful and what is harmful to him at a given moment. If such a conviction is grounded on profound knowledge and practical experience, the concept of self-government can be approved in principle. Even applied to a person with extensive medical and specialized education, however, self-control of physiological state will only be a variation of self-treatment, which many times is not justified even in terrestrial conditions.

Medical selection of cosmonauts is an important instrument for increasing man's reliability in space and consequently maintaining his health. It is essential not only to reduce to a minimum the danger of occurrence of medical problems but also to predict the resistance of mission candidates to the effects of the factors of space flight. A decision on fitness for a forthcoming manned mission thus is becoming one more area of prediction in space medicine. The task boils down to establishing the relationship between the indicators of a person's initial physiological state and his reactions to effects characteristic of space flight. Resolution of this problem is complicated by incompleteness of input data. We do not yet understand the reasons for the lack of a link between susceptibility to motion sickness on earth and in space. It is even more difficult to predict the consequences of protracted adaptation to weightlessness in a specific individual, taking into consideration the individual features of his initial physiological state. These consequences can change in relation to attendant circumstances.

The need for a differentiated approach to cosmonaut selection, taking into account the functions performed by the different crew members, the type of mission vehicle, its equipment, and mission duration is becoming increasingly more obvious. And although the selection criteria presently being employed have unquestionably proven themselves, specialists in space medicine are continuing to work on their further refinement.

Working on the basis of devised methods of forecasting and managing cosmonauts' physiological state, space medicine has proven capable of accomplishing in a prompt and timely manner the complex tasks of providing medical support for manned missions of increasing duration, thus making a major contribution toward effective conquest of space by man.

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## PILOTS PRACTICE SIMULATOR APPROACHES ON REDUCED INSTRUMENTS

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[Article, published under the heading "The Reader Suggests," by Lt Col Med Serv E. Kozlovskiy and Capt Med Serv Candidate of Medical Services L. Drach: "Honing Skills on Simulators"]

[Text] Before proceeding with simulator training in the simulator classroom, the instructor explained the mission in detail to the pilots. It involved the following specific features. After takeoff, in order to disorient the pilot, they would induce instrument failure: artificial horizon, ADF, DME, VOR, localizer and glideslope, and flight director. Between 60 and 90 seconds after executing a turn in any direction, the stylus representing the aircraft is positioned on the board at some "point" located 5-10 kilometers from the outer marker. The artificial horizon, ADF, and DME are then switched on, and the pilot is instructed to determine the aircraft's location in relation to the runway with two ADF pointers and the DME, to plot an optimal maneuver to approach the procedure turn entry and to execute the approach.

Upon hearing the problem, two pilots stated outright that there was no possibility to accomplish the task. But following a detailed discussion of the drill, they agreed that the problem was solvable after all. During the first simulator session some of the pilots were unable to handle the task without outside help. The remainder, following a number of maneuvers, did succeed in getting their aircraft on a final approach path, but with considerable heading errors. During the second and third sessions their actions were of a more purposeful character, and they brought their aircraft onto final approach heading more intelligently -- after crossing the outer marker they determined the location of the runway from the relative ADF bearing to the middle marker compass locator, and executed a maneuver to enter the procedure turn. In the next three sessions the pilots, employing a number of reference points, using the ADF and DME, immediately plotted a maneuver to proceed to the procedure turn point of entry. In addition, subsequently they succeeded in maneuvering onto a correct final approach heading entirely on the basis of backup instruments. Following one or two practice sessions, acquired skills would begin to deteriorate in from 3 to 6 days, while fairly solidly acquired skills (5-7 practice sessions) would be maintained with no-practice intervals of up to 3 months.

Of course the probability of such a combination of malfunctions during an actual flight is infinitesimally small, but it is not impossible in a combat situation. Practice sessions help not only rehearse actions in a specific situation but also develop a pilot's skills in orientation by visual reference, landing approach with minimum navigation information, its utilization to monitor the operation of other navigation systems and, most important, increase psychophysiological preparedness to perform missions in the most complex conditions.

We should emphasize that redundant control, performance and navigation instruments contain a great quantity of supplementary information, which under normal conditions we practically do not utilize at all. This somewhat diminishes reliability of pilot performance in extreme conditions. Flying in flight-director or automatic mode, for example, especially during a landing approach, significantly alters the structure of a pilot's activities, removing him from the aircraft, as it were, and fosters impoverishment of his flight picture. When malfunctions occur in the automatic control system, in many instances it is not easy to spot them or shift to another piloting mode. The habit of flying approaches with precision systems leads to loss of skills in flying by ADF and VOR. The pilot does not fully utilize information from these instruments to refine his flight path, especially when executing a transition maneuver into final approach.

In the course of study and research, experts tested several variations of exercises aimed at developing in personnel skills in executing a landing approach with limited navigation information and devised a method of conduct of these exercises.

When flying an approach on dual ADFs and DME, the pilot should utilize the following information indication to determine his position relative to the runway and to decide subsequent actions: distance from runway, bearing of ADF tuned to the outer marker compass locator in relation to that tuned to the middle marker compass locator, the bearing of the ADF pointers and the dynamics of their displacement as the approach progresses. For example, following stylus move and switching on ADF and DME, the pilot sees that distance to the runway is exactly 8 kilometers, both ADF pointers are indicating approximately  $330^\circ$ , with the outer marker compass locator indicating left of the middle marker compass locator, the angle between them is approximately  $5^\circ$ , and is decreasing. There can be several problem solutions, depending on the pilot's degree of proficiency.

First: "In this situation I cannot determine my position, and therefore I shall head for the outer marker and align myself on final when I pass over the compass locator.... The pointer tuned to the outer marker compass locator has begun swinging, and the middle marker pointer shows a relative bearing of  $155^\circ$ . This means the runway is on my right. I shall align myself to the runway by turning the calculated number of degrees. For this I must turn right  $5^\circ$  and begin my procedure turn at a distance of 16 kilometers. I shall check accuracy of flying to the point where I initiate procedure turn by ADF and DME: at 16 kilometers from the runway threshold the outer marker compass locator pointer should be  $2-3^\circ$  left of the middle marker pointer, with a relative bearing reading of approximately  $180^\circ$ . When I am right on the runway center line extended, the ADF pointers should be right on top of each other and indicating zero degrees.



If the pointers are not aligned, I should hold the outer marker compass locator pointer between the middle marker compass locator pointer and zero."

Second: "The outer marker pointer is left of the middle marker pointer -- I am to the right of final approach path. Continuing on this heading, the angle between pointers decreases, which means I am approaching the runway center line extended, but moving away from the field. When the ADF pointers align, I shall turn to an outer marker heading and, on passing over it, shall turn 30 degrees right (or left) to set up final runway alignment. I shall execute a 30° turn using the following time calculation: at a speed of 350 km/h and a 20° bank, the turn will take 15 seconds." (A memory aid: when  $V=350$  km/h and  $\gamma=20^\circ$ , the time to execute a turn is approximately equal to one half the number of degrees turned.)

Subsequent actions are the same as in the first solution.

In this illustration the first solution happened to be better than the second, since it required fewer turns, and the flight path proved to be shorter. The second, however, indicates that the pilot has better orientation from his instrument readings and, with other variations of "otvod" [stylus displacement on terminal area chart], it will be more convenient for the approach. The instructor can ask the pilot about the nature of his approach solution decision some time after he commences to execute the problem.

Successful performance of the drill is also helped by memorizing the position of the ADF pointers and DME readings at various points in the landing pattern or terminal holding pattern. Precision of the maneuver to reach the point of initiation of the procedure turn onto final depends in large measure on mentally working out in advance the sequence of actions with different variations of transition, ADF and DME readings. Here it is expedient to use instrument panel photographs containing various combinations of these instruments' readings. Research has shown that study of 50 such photographs by the pilot is equivalent to approximately two sessions on the simulator. We should note that running through an approach problem in one's mind is only a condition for faster assimilation of the drill. Practical assimilation of the problem on the simulator is a more complex process, since performance of mental operations is difficult when actually in the air.

An approach based on two ADF readings, without DME, is a more difficult problem. In this case it is absolutely necessary to fly to the outer marker to perform the final turn maneuver calculation. Plotting of the maneuver is based on precisely flying the calculated times along the straight-line segments and maintaining the precise bank angle in executing turns. After turning to the final approach heading, the pilot descends to a height of 200 meters above field elevation. The pilot continues descent after passing the outer marker, following the normal configuration.

When executing an approach using a single ADF, the pilot determines his location relative to the runway after crossing the outer marker, as well as at certain check points, by manually retuning the ADF to the middle marker compass locator frequency. The maneuver is executed using the clock. This method does not produce a highly-precise approach to the final heading (error is not less

than  $\pm 5^\circ$ ), and therefore it is recommended that the pilot use his localizer and glide path receivers.

The landing approach following stylus displacement can also be executed using VOR, ILS, and DME. The pilot first determines his heading relative to the localizer course, and then, estimating the dynamics of change in DME range to the runway, he determines what side of the localizer course he is on. If range decreases, it means that the aircraft is moving toward the field, while if it remains practically unchanged, the runway threshold is  $90^\circ$  from the aircraft's heading. Figuring on the basis of these data, it is not very difficult to plot the final approach maneuver. The localizer and glide path pointers are used for precision final approach alignment. In performing all drills, the screen with runway display is switched on after passing the middle marker only for the pilot to check the accuracy of his approach. This makes it possible not only to make the problem more complicated but also efficiently to master skills in shooting approaches at minimum ceiling and visibility.

The suggested drills help improve pilots' psychological readiness to fly in a difficult situation, help establish pilots' confidence in their abilities, help diminish nervous and emotional stress, and help increase reserve capability to solve problems not directly connected with flying the aircraft.

In the course of the practice sessions, the pilots developed considerably greater interest in working the approach problems and developed mental satisfaction from performing the job well. Their attitude toward simulator training changed appreciably. All pilots without exception noted the unquestionable benefit of such training activities. It is gratifying that we have received many suggestions from pilots directed toward improving the methods of introducing instrument failures. New variations involving further complication of flight problems were examined. Close contact between experimenters and trainees had an excellent effect on improving pilot flight proficiency.

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## AIRCRAFT REPAIR, OVERHAUL PLANTS IMPROVE PERFORMANCE

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[Article, published under the heading "Know-How of the Finest Into the Combat Arsenal," by Maj Gen A. Antonov: "Aircraft Return to the Line"]

[Text] Workers at aircraft overhaul and repair enterprises perform a complex aggregate of tasks -- they repair and overhaul aircraft, and they concern themselves with improving operating efficiency and quality in all technological components. They campaign for thrift and economy and work persistently to adopt the experience and know-how of vanguard workforces and top specialists. This country's achievements in building communism inspire them to new patriotic deeds and accomplishments. The decisions of the November (1982) CPSU Central Committee Plenum, the points and conclusions contained in CPSU Central Committee General Secretary Comrade Yu. V. Andropov's speech at the Plenum have become a guide to action for aircraft repair and overhaul workers.

The workers at these enterprises have achieved appreciable success and have extended the service life of many fixed-wing and rotary-wing aircraft. The plan targets for the first two years of the current five-year plan were achieved ahead of schedule. Production volume increased 8.9 percent. Ninety-two percent of production volume was achieved by increasing labor productivity by 8.1 percent. Tens of millions of rubles worth of additional production was turned out.

Experience indicates that success in accomplishing plan targets is achieved wherever unity of political and economic activity is secured, and where officials, party and trade union organizations are constantly concerned with improving conditions on and off the job, worker rest and recreation conditions, combine a high degree of demandingness with a cordial attitude toward people, and correctly apply economic, administrative, and indoctrinational measures in production management.

A great many managers whose experience merits attention are employed by Air Force aircraft repair and overhaul organizations. For several years running the workforce led by party member I. Rybin has been achieving excellent performance results. It was among the first to report completion of socialist pledges in the second year of the five-year plan. Officer Rybin knows well the interests of the workforce, prizes public opinion, and works in close contact with the

party organization and trade union committee. He is a firm, demanding individual and solidly maintains labor and process discipline. He is characterized by a constant endeavor to keep pace with the times and to support the new and progressive. The example of this vanguard commander, acting as a spark, also ignites the flame of innovativeness in others as well.

There was a time when this enterprise had certain shortcomings. Together with the party and trade union organizations, party member Rybin examined the causes of errors of omission in a businesslike manner and took steps to eliminate them in short order.

The aircraft repair and overhaul workers displayed a great deal of intelligent initiative in setting up work stations. This made labor more efficient, reduced time losses, had a positive influence on strengthening discipline, and reduced labor turnover. This workforce was one of the Air Forces' first to earn the title "High Production Efficiency Enterprise." For achievement of high performance results in competition based on results for the preceding year, it was awarded the challenge Red Banner of the CPSU Central Committee, USSR Council of Ministers, All-Union Central Trade Union Council, and Komsomol Central Committee. It was twice entered on the Honor Roll at the Exhibit of Achievements of the USSR National Economy.

Air Force aircraft repair and overhaul enterprises have greatly changed in recent years. Their production capacity has expanded significantly. The range of tasks they perform has also increased. More than half of the workforces honored May Day and Victory Day ahead of schedule and with excellent technical-economic performance indices.

The forms of socialist competition conducted here are diversified. They include first and foremost a movement for a Communist attitude toward labor and a campaign for excellent production results on the basis of bilateral contracts, as well as for ahead-of-schedule completion of individual and brigade targets. Extensive competition has developed for the honor of earning the title "Best Brigade (Section)," "Best in Trade," "Outstanding-Quality Worker," "Best Young Worker," and "Best Instructor."

The work performance rivalry is grounded on Leninist principles of competition: publicity and comparability of results, possibility of practical repetition and extensive dissemination of advanced know-how.

Virtually all workers at Air Force aircraft repair and overhaul enterprises are presently involved in competition. More than 90 percent are taking part in the movement for a Communist attitude toward labor. More than 60 percent of the shops and 50 percent of the brigades and sections have been awarded the title "Communist Labor Collective."

Communists and Komsomol members march in the vanguard of the campaign for excellent quality of aircraft repair and overhaul. Many of them have been awarded Socialist Competition Winner badges. A. R. Romashko and M. Mikhnovskiy were awarded a USSR State Prize. A number of aircraft repair and overhaul enterprises have been awarded the title "Exemplary."

Aircraft repair and overhaul workers are far from complacency. A critical and demanding approach to the results of their labor is fully justified. Air Force repair and overhaul enterprises have at their disposal costly equipment and specific production facilities enabling them successfully to accomplish highly complex tasks. Any violation of labor rhythm, which unfortunately sometimes occurs, leads to material and economic losses and has an adverse effect on work quality. We cannot tolerate this.

The achievements of vanguard workers convincingly confirm the decisive role of discipline in increasing labor efficiency. For a great many years now, for example, the aircraft repair and overhaul enterprise directed by officer O. Novosel'skiy has marched among the right-flankers. They have reduced labor turnover to a minimum. They have almost totally eliminated instances of absenteeism, lateness in reporting for work, and other violations. The workforce is amicable and cohesive, bonded by a common responsibility for the assigned task. Also very important is the moral microclimate, which impels people to work conscientiously, to cherish the worker's honor, and to be imbued with the interests of their enterprise.

A businesslike atmosphere on the job is a result of joint efforts by management, the party, trade union and Komsomol organizations, and purposeful indoctrination work. They have built a solid barrier here against violations. Whoever deviates from requirements is punished not only morally but materially as well, first and foremost receiving a cut in the coefficients of quality of work performed and labor participation, which naturally reflects in wages; they are deprived of bonuses and cash reward based on the year's work results.

It was noted at the November (1982) CPSU Central Committee Plenum: "We must wage a resolute campaign against all violations of party, state, and labor discipline." In light of these demands, Air Force repair and overhaul enterprises follow the practice of reassigning violators to low-pay jobs in conformity with labor laws, shifting their vacation time from summer to later in the year, depriving them of low-cost travel and accommodation package vouchers, and placing them further down the list for receiving housing. A number of enterprises have enhanced the role played by brigade and foreman councils and other public organizations.

The state of discipline is taken into consideration when evaluating the activities of workforces, in totaling up socialist competition results and in confirming the honorary titles "Communist Labor Workforce (Shock Worker)" and "Exemplary Enterprise." A labor discipline indicator has been included among the conditions of socialist competition at Air Force cost-accountable industrial enterprises for the 11th Five-Year Plan. Workforces achieving excellent performance results are mentioned in commendations issued by the commander in chief of the Air Forces. Enterprises with a low level of organization of labor are deprived of bonuses and receive lower points in totaling up socialist competition results for the month, quarter, and half-year.

Communist labor schools play an important role in improving the quality of aircraft repair and overhaul and in strengthening discipline. At the present time more than a thousand of these are operating at repair and overhaul enterprises.

Recently there has been a considerable intensification in the work of comradely courts, volunteer people's druzhinas and permanent production conferences. Their activities are directed toward improving labor discipline and eliminating shortcomings in their work.

Officials at all levels seek to provide moral and material incentive to those who work conscientiously, who carry out their duty flawlessly, and who extend the service life of airplanes and helicopters with their selfless labor, for improving working and living conditions is also a most important reserve potential for further increasing labor productivity and improving the quality of aircraft repair and overhaul.

The mentorship movement is playing an important role in labor indoctrination of youth. Each year several thousand young workers receive good labor conditioning under the supervision of mentors.

Much is being done to achieve further improvement of brigade forms of organization of labor and wages and to develop among workers competition on the basis of individual or brigade production schedules, and among engineers, technicians and white-collar employees -- on the basis of personal work accomplishment plans. At the present time more than 83 percent of workers are in brigades. Approximately 60 percent of brigades employ a labor participation factor (KTU). This progressive form of organization of labor and wages will experience further development and in time will become the principal form used.

In conformity with the requirements of an order issued by the USSR minister of defense, at the present time combined programs are being drawn up at Air Force aircraft repair and overhaul enterprises, aimed at substantially reducing manual labor. Commissions have been formed and a list of jobs has been determined where mechanization is needed on a priority basis. These jobs involve first and foremost loading dock workers, painters, washers, metal trades benchworkers repairing aircraft, as well as other specialists.

In conformity with Air Force aircraft repair and overhaul enterprise social development plans, more than 6,000 square meters of housing have been completed and made available for occupancy in the last two years of the 11th Five-Year Plan, and new dormitories, children's facilities and rest and recreation facilities have been built. Each year more and more workers, engineers, technicians, and white-collar employees spend their vacations at sanatoria, rest hostels, and at vacation centers. Many enterprises have their own cultural centers, clubhouses, and movie theaters. Every year health and employee services also improve: almost all workplaces are provided with locker rooms, shower facilities, and employee lounges.

Air Force aircraft repair and overhaul enterprises have been assigned difficult and critical tasks in the current five-year plan. They will be mastering new types of repair on aircraft. Serious attention will also be devoted to further improving production efficiency and work quality at all levels, all-out observance of an economy regimen, plan, process, labor, and financial discipline. It is necessary to work more persistently to disseminate and adopt the experience and know-how of vanguard workforces and individual specialists.

A large aggregate of measures pertaining to social issues is to be carried out. In order successfully to accomplish all this, we must constantly and continuously improve work style, strengthen discipline, more aggressively utilize the mighty force of socialist competition, and focus on achieving high end results of repair and overhaul of aircraft.

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## CONSCIENTIOUS HANDLING OF MAINTENANCE LOGS URGED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 6, Jun 83 (signed to press 4 May 83) pp 36-37

[Article, published under the heading "The Reader Asks," by Engr-Lt Col A. Kul'shin: "No Secondary Matter"]

[Text] "Helicopter ready for inspection!" reported Sr Lt Tech Serv L. Slivets.

The team of regimental engineers proceeded to make a thorough inspection of the helicopter. There was every indication that it had been prepared well for the inspection. Instruments, windshield, and rotor blades were gleaming. Unbuttoned inspection covers provided access to the motors, other machinery, and radio gear. It did not take the inspecting officers long to see that the equipment was well maintained. Ground equipment was also fully in order. It seemed that there was every reason to give high marks to the performance of Sr Lt Tech Serv Slivets and his men. But they had to lower the mark. Here is why.

The airframe and engine log were filled in in a careless manner. Contrary to regulations, entries had not always been conscientiously made, and there were corrections and emendations which were not properly certified by official signatures. Errors were also discovered in the figures contained in the engine log. The helicopter technician responded more calmly to the critical remarks than one may have expected: after all, nothing harmful had happened, the equipment was in order, and documentation is a secondary, correctable manner. A profound delusion!

A serious talk on this matter was held with the helicopter technician and his immediate superiors. The squadron's deputy commander for aviation engineer service and the section technical maintenance unit chief were supposed to check to verify how their subordinate filled in the various logs and other documents. We must note that they took the criticism in good spirit and corrected the situation.

As regimental deputy commander for aviation engineer service I saw time and again that the majority of ground maintenance specialists fill out technical documentation promptly, conscientiously, and according to required procedures. People attach as much importance to this as they do to caring for the airframe

and powerplant. Specialists 1st Class Capts Tech Serv A. Zhakota, S. Pravednikov, and others are such persons. They perform the postflight aircraft inspection and preflighting always with the logs close at hand, in which they enter discovered problems and aircrew comments. They consider their work completed only when each such entry is marked "completed." They usually leave some time at the end of the workday for reviewing and filling out documentation.

But the incident with officer Slivets shows that not all ground maintenance technicians attach proper importance to correct and on-time maintaining of documentation. They are wrong. Log entries contain valuable information on performed preventive medicine and repairs, malfunctions occurring during helicopter operation, and their causes. They constitute interesting material for a more detailed analysis of a helicopter's mechanical condition.

Once the low fuel warning light ignited on the helicopter carrying flight engineer Capt Tech Serv V. Kovalenko during execution of a maneuver. What was the problem? The pilot looked questioningly at Kovalenko, who was seated next to him. Checking the fuel gauge readings and switches, the latter reported confidently: "There's plenty of fuel. It is apparently a problem with the warning light...."

The officer noted the speed, altitude, engine rpm and other parameters in his notebook. Later, after the helicopter had returned safely to the field, thanks to these data aircraft equipment group specialists were able quickly and surely to determine the reason for the faulty warning light indication. It seems that insulation had worn off a wire. The problem was corrected.

Captain Technical Service Kovalenko and the aircraft equipment group specialists reached conclusions for themselves for the future from this incident. During equipment preflighting procedures they now began regularly including in the inspection process that point where the malfunction had occurred. The log entry reminded them of this. There were no further warning light malfunctions of this kind.

In connection with this I should like to reemphasize that conscientious, prompt and correct maintenance of documentation is a reliable means of ensuring failure-free aircraft operations. Unfortunately some people have failed to grasp this fact. Sometimes a maintenance specialist, discovering a defect on an airplane or helicopter, endeavors to correct it as quickly and reliably as possible, which is quite natural. But he is in no hurry to make an entry in the preflighting log. It would seem that one would not accuse such personnel of a lack of conscientiousness or lack of a feeling of responsibility in the performance of maintenance operations. Nevertheless they merit a reprimand, because they are ignoring prompt filling out of documentation.

Talking to aviation subunit personnel, one reaches the conclusion that at times officers, for the most part young officers, fail to attach proper importance to log entries, considering, for example, replacement of a damaged screw locking device, broken or rusty cotter pin, a defective washer or paint touchup to be such trivial items that there is no need to log them. I have also encountered

officers who have frankly admitted that they endeavor to leave the pages in the log clean or merely enter: "No complaints," motivating their actions by the argument that if there are fewer entries, consequently the equipment is in excellent mechanical condition and they will receive high marks for equipment maintenance. The logic of such arguments is simple: if a defect appears, it means that the person to blame is the aircraft's proprietor, who failed to prevent it.

I believe the fallacy of such actions is obvious. An endeavor to conceal a problem, to embellish the state of affairs, departure from the requirements of guideline documents, rules and regulations are also dangerous in that sooner or later they lead to more serious violations. I am convinced of this by many years of practical experience in training and indoctrinating personnel.

A specialist who makes mistakes in his work cannot serve as an example to other mechanics, particularly those under him. At the same time ignoring the requirements of prompt and correct maintenance of documentation is also fraught with the danger of making technical errors. Of course it is not difficult to replace a torn gasket. Much more time is required to determine the cause of its failure. In my opinion in such cases it is essential each time thoroughly to inspect the entire assembly, to check and make sure that parts located close to it are securely fastened down, and to consult with a more experienced aviation specialist. A great deal can be learned from flight recorder data and a follow-up conversation with the pilot.

Maintenance experience confirms that a serious helicopter malfunction does not occur suddenly. As a rule it is preceded by secondary signs of failure, which even a highly-proficient specialist is not always able to note in time. A prompt entry in the preflighting log will help both the maintenance technician and his supervisors prevent problems and malfunctions.

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#### PROBLEMS WITH CARELESS SHOP MAINTENANCE PROCEDURES AIRED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 6, Jun 83 (signed to press 4 May 83) pp 38-39

[Article, published the heading "Observance of Regulations Is Law," by Gds Capt V. Yevtushenko, deputy technical maintenance unit chief for political affairs: "Teaching by Trust"]

[Text]. Regimental technical maintenance unit chief Gds Engr-Maj G. Dubrovskiy summoned the officers to his office and summarized that day's work performance. He then assigned the specialists a new task. They would be taking in another aircraft for preventive maintenance. In addition to performing servicing procedures on it, which would run quite a few hours, it was necessary to replace the engine and several components which had reached their specified service life.

"In view of the greater complexity of operations to be performed," stated the technical maintenance unit chief, "we shall have to deploy specialists in a new configuration and utilize additional test equipment and tools. As you know, my deputy is temporarily away. Guards Captain Technical Service Kiforenko will perform his duties."

The aircraft turned over to the technical maintenance unit was completed and ready to go precisely on schedule and was turned back to the squadron precisely when requested. Subsequently it operated with no problems throughout the entire scheduled time between maintenance.

Officer P. Kiforenko, in charge of the airframe and powerplant servicing team, had recently been transferred from the squadron to the regimental technical maintenance unit. Aviation personnel with much greater time in service than him are attached to this unit. They include many master technicians. But the technical maintenance unit chief nevertheless chose precisely this officer, confident that he would be able to handle the job. An energetic and knowledgeable specialist, Guards Captain Technical Service Kiforenko has supervised the work of technicians and mechanics on numerous occasions and has turned aircraft back to the squadrons in a prompt and timely manner. His subordinates emulate him in all things. His team is a socialist competition leader. Recently his men distinguished themselves at a tactical flight exercise held in the regiment: they brought out the special trucks immediately upon notice, successfully

executed a march of a good many kilometers and, deploying their equipment, performed servicing operations on one of the aircraft at a temporary airstrip.

The team's specialists are distinguished by a high degree of professional expertise. A healthy moral microclimate has been established in the collective, based on mutual assistance, respect and demandingness on the part of the men toward one another. And officer Kiforenko deserves considerable credit for this, for until quite recently a number of critical comments were being made about the specialists of the airframe and powerplant team. Violations of military discipline also occurred, and frequently they failed to perform preventive maintenance operations according to the schedule. Pilots and ground maintenance technicians had complaints about the quality of servicing performed by the technical maintenance unit specialists.

This situation concerned subunit aviation engineer service officials. Party member Gds Engr-Maj G. Dubrovskiy, party bureau secretary Gds Capt Tech Serv V. Koval'skiy, and others closely scrutinized the new group chief. They were aware that a much more difficult job here in the regimental technical maintenance unit had been entrusted to Kiforenko, transferred from the position of section technical maintenance unit chief. Here he had more men under him, and consequently he had more work connected with their training and indoctrination. The volume and pace of performance of maintenance operations had increased, as had physical and emotional stresses.

The changes in this officer's job involved certain objective difficulties. At the same time there also occurred errors due to his own fault. For example, he tried to perform some of the most complicated operations himself, instead of supervising technicians and mechanics. And this had a negative effect on the quality of operation-by-operation inspection. In addition, some specialists began to be less demanding on themselves and proceeded to display less initiative. There were instances where in the performance of a job task they departed from rules and procedures and failed to follow the proper sequence of scheduled operations. Much time in this group was spent on readying work stations, smoking breaks beyond the prescribed number, etc.

But errors were promptly pointed out to officer Kiforenko. Somebody even suggested that an experienced supervisor be assigned to the group chief during his period of familiarization. Regimental technical maintenance unit chief Guards Engineer-Major Dubrovskiy, however, was against excessively close supervision.

"Before he came to us," he stated, "Kiforenko had done a fine job as a supervisor and made his section's specialists into excellent performers. I believe that he will be able to handle the new job. All he needs to do is respond to critical comments. It would be more useful for the success of the operation to confer on how to help this young supervisor shape his group up faster...."

At one of their meetings the aviation engineer service officials recommended that Petr Andreyevich interview his men to test their knowledge of general military regulations and remind them of their job duties. Other suggestions were also made, in particular the suggestion to organize practice sessions on the most critical and laborious processes. The officers advised him to begin the

workday with an inspection of the aviation engineer service specialists' appearance and assignment of tasks for the work shift, and to grade the job done by each mechanic when determining work performance results.

This conversation proved beneficial. The group chief followed the recommendations. And gradually things began to improve in the subunit. The men gained confidence and a heightened sense of responsibility and, most important, the men gained faith in themselves. Inspired by the confidence given him, Kiforenko was rapidly shaping up.

Communists and Komsomol members greatly assisted the officer in establishing firm observance of regulations in the group. For example, Komsomol committee secretary Gds Sr Lt Tech Serv A. Semenov and Komsomol member Gds Sgt B. Chuprina focused special attention on aviation specialists who were displaying carelessness in performing servicing operations. A frank, incisive talk was held, in particular, with Komsomol member mechanic M. Karchaidze, who frequently violated the rules and procedures of tool utilization and would omit certain operations in inspecting equipment.

The party and Komsomol activists informed the group chief on their actions. Kiforenko constantly felt the support of his technical maintenance unit superiors. Gradually they began assigning him more complex tasks.

"Petr Andreyevich, will you and your men be able to rebuild and adjust an ultrasound unit for cleaning filters and get the cockpit airtightness testing equipment working properly?" The technical maintenance unit deputy chief once asked him.

"No problem."

"How much time and how many specialists will you need? Do you need to consult with engineers?"

They arranged these matters as well.

Kiforenko handled the assigned tasks with confidence, displaying excellent organizer abilities and efficiency. Another contributing element was the fact that he acquired experience in scheduling work on one or several aircraft. Operation-by-operation inspection improved in the group. It is now confidently building on its successes.

We have many examples of such work with young supervisors. Combining proper demandingness with concern about subordinates, strictness in verifying execution with confidence, the officers of the regimental aviation engineer service and the subunits are developing dependable assistants to the pilots. This work style is constantly improving and is discussed at the methods council. It is true that errors and failures do sometimes occur. At times excessive confidence is perceived by a young officer quite incorrectly. This was the case with Gds Lt Tech Serv A. Kovalev.

This officer had recently come to us upon graduating from military aviation technical school. His personnel file noted that he had received grades of

good and excellent, was inclined toward volunteer work, and had proven to be a skilled organizer. Indeed, we soon saw that these evaluations were correct. One could feel that Kovalev liked working with machinery. Soon he was doing unsupervised aircraft maintenance. A vacant position opened up -- that of servicing group senior technician. Kovalev was mentioned as one of the possible candidates.

Some officers expressed the opinion that it was premature to promote the lieutenant, that he should gain a better mastery of a technician's duties and acquire indoctrinator skills. But nevertheless they decided to give him a try, considering that Kovalev's knowledge and energy were sufficient, and a job promotion would be a good work incentive for him. We were counting on his desire to justify our faith.

Kovalev began work in his new job well. His comrades were sincerely pleased with his initial success. But they soon noted that the young supervisor had begun displaying signs of laziness, was handing over his own duties to subordinates, and sometimes would perform operations in a careless manner. And, most important, he was responding wrongly to comments by his superiors.

Once the mechanics switched polarity in mounting a wire on a piece of equipment. The senior technician inspected their work in a perfunctory manner. As a result the equipment failed. Some time later Kovalev did something else wrong. Failing to inform his group chief, in violation of the technical documentation requirements he proceeded to change the brushes on an electric motor without removing it from the aircraft. He had good intentions, of course -- to speed up the job. But failure to heed his own good judgment and failure to follow the requirements of guideline documents stood him in poor stead. It became necessary to replace a pump prematurely.

Kovalev was given disciplinary punishment. His superiors in the subunit aviation engineer service talked a great deal with him about the responsibility of an aviation engineer service officer and advised him on how to correct his mistakes. Entrusting critical operations to him, they monitored his job performance. They also directed attention to how this officer was handling relations with his subordinates and with specialists from other servicing groups. Kovalev felt attention on himself at all times. This young officer has changed unrecognizably. He has become more serious and does not make mistakes. Gds Lt Tech Serv A. Kovalev is now one of the pacesetters in competition.

The people in aviation have a good, time-tested saying: "While trusting -- verify!" This saying contains profound meaning. It reminds us that a specialist can be educated by trust only under the condition of rigid demandingness as required by regulations, that demandingness which tolerates no unnecessary relaxation of demands in matters large and small, which helps form a healthy moral atmosphere in the collective. USSR Minister of Defense MSU D. F. Ustinov, member of the CPSU Central Committee Politburo, noted the following in his speech at the 6th Armed Forces Conference of Secretaries of Primary Party Organizations: "Observance of regulations presupposes proper mutual relations among military personnel, strict observance of the daily routine, intelligent organization of personnel leisure time, and strong, conscientious personnel inner discipline." And we always bear this in mind.

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## FUEL FILTER CLOGGED WITH PUZZLING RESIDUE

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 6, Jun 83 (signed to press 4 May 83) p 39

[Article, published under the heading "Difficult Quest," by Engr-Lt Col N. Burtyshev: "Why Did the Filter Become Clogged?"

[Text] Lt Col V. Ivanov, who had just taken off, reported that a warning light had flashed on, indicating a problem with the fuel system automatic control functions. The tower controller instructed the pilot to abort the mission and land.

Experienced engineers officers A. Trukhin, D. Tertitsa and others decided first of all thoroughly to inspect the fuel system automatic control devices. The fact is that a similar incident had already taken place in one of the units. In that instance the filter element was clogged with an unidentified fouling agent. The officers concluded that contaminated fuel was the culprit. An aircraft technician removed the filter with difficulty and immediately saw that a substantial quantity of a soaplike substance had collected in the filter.

They took fuel samples from the tanks for analysis. Foreign substances were detected in the fuel, substances which dissolved readily in gasoline. This was an important factor in determining the causes of deterioration in fuel quality.

They had never before encountered this kind of problem. Maintenance specialists know what steps to take when a filter becomes clogged with mechanical impurities. First of all it was necessary to determine why sediment had formed. They had to remove and inspect filters from several fighters and to take additional samples from the bottom of storage tanks, drums, and filters. Fuel service specialists proceeded to determine the chemical composition of the sediment. They were able to determine that the residue consisted of resinified substances brown and dark brown in color, greasy or gelatin-like, with a persisting smell of burnt rubber. At first this suggested that the cause might be microflora breeding within the fuel itself. But microbiologists rejected this theory.

The substance was subsequently investigated with the aid both of conventional and analytical methods. In particular, specialists performed spectral analysis and flame photometer tests. And they discovered in and around the residue a significant quantity of sodium. This was most curious. Where could it have come from?

The action of mineral acid on the residue released naphthenic substances, which were identified by their infrared spectrum and acid number. They confirmed that the residue contained sodium salts of naphthenic acids, in other words, naphthenate. It readily adheres to the metal surface of fine filter screens, clogs the spaces in the filter element, and the impurities accompanying the naphthenate intensify the fouling process. Getting into sensitive automatic control components, they disrupt their functioning. This was the reason why the fuel pressure warning light flashed on in the cockpit of the aircraft piloted by Lt Col V. Ivanov.

Further investigations indicated that it is easiest to detect trace amounts of these acids prior to fueling an aircraft at the airfield.

We regularly remind the men of the necessity of scrupulously observing the requirements of guideline documents. When briefing personnel prior to flight operations, the fuel service chief shows them samples of residue, clogged filters, and tank-bottom fuel samples with typical signs of contamination. This helps aviation personnel determine the distinctive indicators of fuel containing foreign substances.

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# COSMONAUT BYKOVSKIY INTERVIEWED ON SPACE PROGRAM

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 6, Jun 83 (signed to press 4 May 83) pp 42-43

[Interview, published under the heading "Current Interview," with Candidate of Technical Sciences Col V. Bykovskiy by AVIATSIYA I KOSMONAVTIKA correspondent; date and place not specified: "Space -- For Peace. Who Is Against It?"]

[Text] Our correspondent met with Soviet pilot-cosmonaut twice Hero of the Soviet Union, Candidate of Technical Sciences Col V. Bykovskiy and asked him to respond to a number of questions.

[Question] Many people are concerned by the present world situation and the arms race, including in space. As the Soviet and foreign media have reported, in the United States last year a Presidential Directive was announced, stating a new policy in exploration and utilization of space. Valeriy Fedorovich, can you tell us to what this has led to date?

[Answer] This directive is one of the "combat" units of the American President in his "crusade" against the socialist countries. In contravention to the treaty on principles guiding the activities of nations in the exploration and utilization of space, including the Moon and other celestial bodies, and contrary to the agreement between the USSR and the United States on cooperation in exploration and utilization of space for peaceful purposes, he is developing an extensive program of measures to militarize space. The U.S. national space program is presently divided into two parts -- military and civilian, with the former receiving priority. This program is assigned quite specific goals, first and foremost the stepped-up militarization of space and streamlining of the organizational structure of the agencies managing military space activities. A so-called space command, the function of which is to prepare for war in space and from space, became operational on 1 September of last year. Development of antisatellite weapons is proceeding at an accelerating pace. They have already announced the deployment location of two squadrons of F-15 fighters armed with satellite-killer weapons. A new space center went into operation on 1 October at (Kirtpend) Air Force Base, which will coordinate research and development of laser weapons, space monitoring and nuclear missile attack warning systems. Construction is in full swing at Vandenberg Air Force Base on a center from which military space shuttles will be launched beginning in 1985. They are planning to put orbital command posts and spy satellites into space and to test

laser and particle-beam weapons in space. The main purpose behind all these preparations is an attempt to gain military-strategic superiority over the Soviet Union. History can tell us to what such plans lead. But first they sow seeds of distrust among people, in relations between nations, and give rise to the danger of an arms race.

[Question] How do you appraise the Space Shuttle missions?

[Answer] Unfortunately the Space Shuttle program is increasingly being subordinated to the interests of the Pentagon. A classified payload was carried on the fourth Shuttle mission, and the astronauts were assigned missions of a purely military nature. Half of all the scheduled Space Shuttle missions up to 1994 will be for Department of Defense activities. Today every person with common sense asks himself what is the purpose of this reckless policy and what will be its consequences? Evidently it has become disadvantageous to those who are concerned with "U.S. vital interests," who are inventing and trafficking in the most sophisticated and dangerous weapons, to deploy them on land, in the ocean, and in the air. They want to take over the universe. These insane plans contain the nucleus of a new kind of escalation of the arms race. War in space is much more dangerous than on the Earth, since its consequences can lead to irreversible processes and the destruction of life on our planet. Just where is that common sense the Americans boast about having? Why is their president and his administration not thinking about the future of their people and their children?

[Question] What are the principal directional thrusts in development of the USSR space program for coming years?

[Answer] They are defined by the documents of the 26th CPSU Congress. In contrast to the United States, the Soviet Union does not seek a monopoly in space. The party calls upon us actively to participate in solving international problems in the area of peaceful exploitation of space. There are a great many plans and programs for international cooperation in coming years. They unify the efforts first and foremost of the socialist countries. Quadrilateral, trilateral, and bilateral cooperation is also specified. One of the largest programs is the Venus-Galileo Program. France, Austria, and the FRG have stated their desire to take part in this program together with the socialist countries. Next year a combined Soviet-Indian crew will fly a mission on board Soviet space hardware. Study of the upper layers of the atmosphere and the interlinkages between the Sun and the Earth is of great significance. The Sun is a major factor in forming the Earth's weather and climate. Such investigations will be conducted with the participation of artificial Earth satellites. The documents of the 26th CPSU Congress call for utilization of satellites for studying Earth resources and for methods of accelerated geological-economic evaluation of mineral deposits. Already today dozens of institutes of the national economy, including in the socialist countries, are working in close contact with the Cosmonaut Training Center imeni Yu. A. Gagarin and the State Nature Center. In coming years we will be accomplishing in this area the task of further improving and refining remote Earth sensing equipment and techniques. The Tsvet-1 visual colorimeter, for example, is undergoing tests at the State Nature Center. This country's growing needs demand extensive employment of satellites for multiple-channel TV and radio broadcasting as well as telephone

communications with remote areas, and phototelegraphic transmission of central newspaper text. The USSR has already introduced five-zone TV broadcasting for the Central Television first channel and three-zone for the second. This enables our country's people to view broadcasts from Moscow at a time convenient for them. Improvement of communications satellites is proceeding in the direction of increasing their transmitter power, which enables us greatly to simplify and reduce the cost of ground stations. In the Orbita system, for example, antennas with a 12-meter diameter dish have been replaced with 2.5 meter dishes. X-ray and Gamma-ray astronomy has been born in our time. Carrying scientific instruments beyond the atmosphere has enabled us to study the entire spectrum of radiation emitted by the universe. This is very important for observing the diversified processes taking place in nature. Their study provides a key to knowledge of the fundamental laws governing the structure of matter. Salyut orbital space stations are greatly expanding the capabilities of beyond-the-atmosphere astronomy. Investigations begun with predecessor stations are continuing on Salyut-7, but with the aid of more sophisticated equipment.

[Question] Valeriy Fedorovich, could you tell us in somewhat greater detail about manned space exploration? In particular, how has the Salyut station been improved?

[Answer] The Soviet Union has been using the Salyut orbital space station for more than a decade now. It has been improved simultaneously in several areas: its operational and research capabilities have been expanded, its reliability has been increased, and cosmonaut living and working conditions have been improved. I believe rather flattering things have been said about Salyut-6, on which 27 cosmonauts have flown, including me. Nevertheless, Salyut-8 is not a copy of its predecessor, although they may not differ externally. It is true that some of the viewing ports in the latter station are covered with transparent exterior meteorite shields. These covers are opened during station operations. This helps improve the quality of work performance during extended station operation. The scientific equipment has undergone the greatest changes. The BST-1M submillimeter telescope has been replaced by an X-ray unit to analyze the spectral composition and time variations of X-radiation fluxes. One of the airlock chambers on the Salyut-6 was modified to accommodate the Splav-01 industrial furnace. Now the second airlock has also been improved, which will make it possible substantially to increase the extent of work on experiments employing the vacuum of space. The aircraft-type seats have disappeared from the main control center. They have been replaced by a small portable chair and leg securing devices. Tools and writing gear are now better secured, electrical connectors disconnect more easily, and there is easier access to a number of equipment units for servicing. These changes have pursued a single aim -- to facilitate man's stay in space. The station should become for cosmonauts not only a test facility, factory or institute, but also a movie theater, athletic stadium, and home.

[Question] Let us summarize our conversation. The present U.S. Administration is an advocate of militarization of space; hiding behind a slogan about falling behind the Soviet Union, it has embarked upon a feverish arms race.

[Answer] That is correct. What is incomprehensible is what fallbehind in space are President Reagan and his administration intending to catch up with by countering Soviet peaceful programs with their adventurist policy of militarization of space.

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## SOVIET SPACECRAFT GROUND TELEMETRY NETWORK DESCRIBED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 6, Jun 83 (signed to press 4 May 83) pp 44-45

[Article by USSR State Prize recipient Candidate of Technical Sciences G. Tamkovich: "On Space Patrol"]

[Text] It was a few seconds to launch.... The operators took their places at the command-telemetry complex (KIK) consoles and displays. Antenna system aiming instructions, commands and programs had been fed into computers, which were to be transmitted to the spacecraft. Literally everything had to be provided for: possible failure of a piece of equipment, weather conditions, climate and, finally, possible prediction errors. The computer operators were testing, readying for automated processing of incoming information.

Launch! The precise time of launch and initial rocket booster flight data were coming in from the launch site to the Mission Control Center. The KIK began working. Needed corrections were being computed and added to the antenna array aiming programs, and command output time and other information were being refined. Tension was high: the operators were concentrating their entire attention on the control and monitoring consoles....

The rocket booster had carried the spacecraft beyond line of sight from the launch site telemetry stations, and now it was approaching the first KIK ground station along its path.

"Attention! Target in line of sight," came a message over the speakers.

But the operators were already paying maximum attention. Antenna arrays of various sizes and configurations began the search.

"We have a signal!" an operator reported.

Contact had been made with the spacecraft, and automatic tracking was now commencing. The tension lessened, yielding to precise, well-practiced actions by the operators. The first KIK station was now at work. Reports were going out to Mission Control Center, reporting that signals were being received, on deviations in the spacecraft's movement parameters, on issuing and transmission of commands.



The success of a control communications session depends in large measure on the professional expertise of the operators -- their thorough knowledge, skills honed to automatism, and fast response. Thousands of communications sessions are held during a mission involving a spacecraft and orbital space station, and tens of thousands of commands and programs are transmitted, on the basis of which various on-board devices and systems are switched on and off. At practice drills the operators had practiced time and time again the issuing of command-program information, and therefore everything was proceeding strictly in conformity with the mission program during this control session as well.

Mission Control Center receives objective information on the cosmonauts' physical well-being, the status of various on-board systems, functioning of automatic control systems, temperature and pressure in the spacecraft orbital module, as well as many other items following automated processing of telemetry data. Every second several hundred thousand measurements are received on Earth. The entire volume of telemetry data is fed into the automated processing loop, which includes special devices for converting, "thinning" it out and tying it to Moscow time. Each specialist evaluates the functioning of his system on the basis of this data.

There also exist so-called diagnostic programs for analyzing the state of on-board systems. In this case the evaluation is made not by a human operator but by a computer. An integral result is displayed: for example, "heat regulation system -- normal." When necessary more detailed information on the operation of all devices can be "summoned." Employment of powerful, high-speed computers makes it possible to obtain processed telemetry data on a virtually real-time basis. It is true that this applies to so-called reduced flows transmitted to the Control Center. The full volume of telemetry data (full flows) is processed somewhat later.

Simultaneously with telemetry, radio trajectory monitoring of slant range, radial velocity, and other parameters is performed. They are recorded on the appropriate ground station devices, which selects out the useful information, ties it in to Moscow time, averages, "bundles" it into standard packages and transmits it by communications links to Mission Control Center. But for the time being Center ballistics specialists are limited to monitoring the spacecraft's movement relative to the computed orbit. A set of measurements at two or three points is needed to determine its parameters. Then the ballistics specialists will state the orbital parameters and other data with a high degree of accuracy.

During a control session all equipment, regardless of where it is based, operates on Moscow time. All telemetry information is also referenced to Moscow time.

The first ground command-telemetry station along the path of the spacecraft has now ended its operating session, but now it is the turn of a second, and a third.... And specially equipped ships are on station in the World Ocean -- ship command-telemetry stations (KKIP). They are deployed along the track strictly in conformity with the recommendations of the ballistics specialists, so that passing of communications from one station to the next is virtually

unnoticed (especially to the uninitiated observer present at the Mission Control Center during radio communications with the cosmonauts). And yet for the orbits of the Salyut-Soyuz complex, as a consequence of rotation of the Earth, from 5 to 6 revolutions each day are out of contact from regular ground stations located on the territory of the Soviet Union from the Far North to the South, from the western borders to the Far East and Kamchatka. In addition, a number of particularly critical operations -- docking approach, and deceleration burns -- take place over the Atlantic, and these operations are monitored with the aid of KKIP.

Three floating control and telemetry centers form the nucleus of the space fleet: "Kosmonavt Yuriy Gagarin," "Kosmonavt Vladimir Komarov," and "Akademik Sergey Korolev." They are sufficiently equipped to perform spacecraft control tasks virtually equal to the volume of tasks performed by the KIK.

Floating telemetry stations form another, larger group of KKIP: "Kosmonavt Pavel Belyayev," "Kosmonavt Vladislav Volkov," "Kosmonavt Georgiy Dobrovolskiy," and "Kosmonavt Viktor Patsayev." They help monitor the state of the orbital complex and maintain communications with the crews.

During the first revolution the main task of the KIK was monitoring of the lift into orbit, deployment of antennas and solar battery panels, as well as checking on the cosmonauts' physical well-being and functioning of on-board systems, while on the second revolution they begin testing the spacecraft orientation systems and preparations for the first maneuver.

We have discussed the operations of the command-telemetry system for controlling spacecraft only on one revolution. But it completes 16 such revolutions in a 24-hour period. The space watch is just beginning and will continue for quite some time: they will be controlling the orbital station and its crew for a period of several months.

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## MONGOLIAN PARTICIPATION IN SPACE PROGRAM DETAILED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 6, Jun 83 (signed to press 4 May 83) pp 46-47

[Article, published under the heading "The Space Program in the Socialist Countries," by V. Lyndin: "Our Mongolian Friends"]

[Text] "When I was a child my father taught me to recognize the stars," related Mongolian cosmonaut Zhugderdemidiyn Gurragcha. "On our immense steppes, where you could travel hundreds of kilometers without encountering a single soul, stars have always been reliable aides to the arats."

In Mongolia nomadic herdsmen are called arats. They conscientiously pass down from one generation to the next the art of navigating by the stars, for often a nomad's life depended in the past on the ability to find his way by stars and sun. Gurragcha's father had inherited the profession of herdsman from his forefathers. When lifting his small son into the saddle, he had no inkling that the latter would be the first Mongol to saddle a cosmic horse and to work on board an orbital space station together with Soviet friends. The old arats never imagined that the sky would serve their descendants with even greater utility. For a country in which the population density is less than one person per square kilometer, aviation, and subsequently space technology as well, became an effective means for accomplishing many economic tasks.

The results of space exploration are already today being put to extensive practical use in Mongolia. The TV signal received from Soviet Meteor satellites and the photographs taken by the crews of Soyuz spacecraft and Salyut orbital space stations facilitate the search for mineral resources and help man plan more efficiently the utilization of natural resources, keep figures on and properly utilize grazing lands. Space photography makes it possible to prepare optimal scheduling of seasonal utilization of grazing lands, grazing stock, and development of a network of wells and acreage suited for growing grain crops, fruits and vegetables. Space photography has provided detailed information on lands affected by erosion processes.

In conformity with the capabilities of its economic base and scientific-technical potential, the Mongolian People's Republic is cooperating fruitfully with the nations of the socialist community in all areas of the Interkosmos Program. It is taking active part in work on scientific methods problems of remote earth

sensing by satellite. Space hardware has enabled Mongolian specialists to prepare an atlas of the earth's surface within the borders of the MPR in different spectral bands, which would be the envy of any European nation. It contains maps of large geologic structures, such as deep faults in the earth's crust as well as ring features, including some which were previously unknown, and maps of seismically active zones and certain areas containing metal ores.

"At the present time the development of cartography in Mongolia," states USSR pilot-cosmonaut V. Savinykh, a graduate of the Moscow Engineer Institute of Geodesy, Aerial Photography, and Cartography, "one can state without fear of exaggeration, is at a cosmic level. I was not so surprised as I was pleased when, visiting Ulaanbaatar, I recognized the chief engineer of the Geodetic Administration as my roommate in the student dormitory, with whom I lived an entire year. Specialists who received their education in the USSR are encountered in all branches of industry and agriculture."

The new Mongolia is a country of universal literacy. The state concerns itself with the younger generation, and the children of arats must also mandatorily attend school. Future cosmonaut Zh. Gurragcha lived with his parents up to the age of seven, after which he enrolled in a boarding school. He received his college education in Moscow, where he graduated from the Air Force Engineering Academy imeni N. Ye. Zhukovskiy.

Mongolia, in the recent past a feudal-agrarian country, during the years of people's rule has accomplished intensive development of its industry. Cooperation with the brother countries of the socialist community in the area of space research prompted a rise in the overall level of science and technology in the MPR and fostered the growth of scientific cadres.

A Council for Space Exploration for Peaceful Purposes was established in 1965 under the MPR Academy of Sciences; the Council was assigned direction and coordination of all efforts in this area. The first practical steps by Mongolian researchers utilizing space hardware took place in 1959, when they began conducting visual observations in Mongolia of artificial earth satellites. That country's favorable astroclimatic conditions fostered the acquisition of valuable data. With improvement of the international satellite observation service, Mongolian stations in Ulaanbaatar and in the Gobi Desert began taking part in many synchronous photographic observations of various satellites for purposes of space geodetics.

An important event for Mongolian scientists was direct participation in the experiments on board the Interkosmos-6 satellite. Investigations were conducted by scientists from Hungary, Mongolia, Poland, Romania, the Soviet Union, and Czechoslovakia. The experiments were to study high-energy cosmic rays and meteorite particles in near-earth space.

The capability to produce more accurate weather forecasts with the aid of satellites is of enormous importance not only for animal husbandry and crop farming, but also for aviation and other sectors of the economy. Since 1971 specialists from the MPR Main Administration of Hydrometeorological Service, together with their colleagues from the other socialist countries, have been

conducting studies on utilization of data obtained from Soviet Meteor weather satellites. In view of the importance of this information, it is planned to establish ground receiving stations in Mongolia.

The Mongolian People's Republic is participating in settling the legal, economic, and technical aspects of establishment of the Intersputnik International Space Communications Organization. An Orbita system ground station has been operating in the MPR since 1970, which has made it possible to receive TV programming from Moscow via communications satellite. Mongolian scientists are planning to utilize the satellite communications system more efficiently, to exploit new frequency bands, and to establish a direct TV broadcasting system. A network of ground receiving stations, which in the near future will cover most of the country, is presently under construction in the MPR with the aid of Soviet specialists.

A station in the Unified Telemetry System for receiving information from satellites of the Interkosmos series, became operational in Ulaanbaatar in April 1980, through the joint efforts of specialists from the MPR and GDR.

One of the areas of medical-biological investigations within the framework of the Interkosmos Program is study of the biorhythms of the human organism as applied to the problems of space exploration. In 1977 study began in the MPR on the diurnal rhythms of man's physiological-biochemical indicators in connection with the cosmonaut selection process. Scientists studied biorhythms in conditions simulating weightlessness, taking into account the specific features of diet and the topographic-climatic features of middle-elevation mountains. An experiment designated "Biorhythm" was added to the Soviet-Mongolian joint manned mission. In addition to continuation of research begun by other international crews, it included three more medical-biological experiments prepared by Mongolian scientists. The "Collar" experiment involved testing a special device -- a preventive neck shock absorber which creates certain pressure on the cervical section of the spinal column and restricts head movement. This device makes it easier on the cosmonaut during the critical period of adaptation to weightlessness. The "Chatsargana" experiment studied the possibility of optimizing cosmonauts' metabolism by the influence of a preparation made from sea buckthorn. The "Neptune" experiment investigated, by means of a special instrument, the eye's deep vision and resolving power at various light levels in conditions of space flight. The "Collar" devices and the "Neptune" device, built in the MPR, were subsequently utilized by the Romanian cosmonaut on board the Salyut-6 station. The "Neptune" experiment was also conducted on the Salyut-7 station by the Soviet-French crew.

All areas of scientific investigation which have become traditional for international crews were represented in the program of the Soviet-Mongolian manned mission. Three industrial experiments were conducted in the area of space materials science: Altay-1 (investigation of diffusion and mass transport in a metal melt, on the example of lead and tin); Altay-2 (growing crystals of vanadium pentoxide); and Erdenet (investigation of the processes of diffusion and redistribution of impurities during dissolving in water and crystallization of a copper salt). In the "Radiation" astrophysical experiment, primary cosmic radiation atomic nuclei were studied by the method of dielectric detectors. Natural mica mined in the MPR was used as a detector. A number of

experiments were conducted to study the earth's atmosphere. A significant part of the scientific program involved investigation of Mongolia's natural resources and the environment. The Soviet-Mongolian crew was assigned 14 visual-instrumental observation tasks.

22 March 1981 went down in the history of the MPR as a red-letter day. A Mongolian citizen, representative of a nation which was a feudal society as recently as 60 years ago, flew into space for the first time.

"I am proud of the fact," stated Gurragcha, "that my country, with a population of only slightly more than one and a half million, is taking part in such major programs as space exploration. I am pleased to have been the first Mongol to be able to gaze at my country not simply from the high altitude of an earth orbit but also from the highest point of social and scientific-technical advance by mankind. I am sincerely grateful to the great Soviet people, who have made us, their Mongolian friends, the gift of cosmic wings."

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## SATELLITES ASSIST IN AIR SEARCH AND RESCUE

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[Article, published under the heading "International Cooperation," by L. Tkachev: "Save Our Souls"; based on materials published in the foreign press]

[Text] On 9 September 1982 the Soviet Cosmos-1383 satellite relayed to the Canadian capital of Ottawa an SOS signal it had picked up. The distress signal was being transmitted by a Cessna 172 lightplane which had made a forced landing in a forested, mountainous part of the Canadian province of British Columbia. Within a few hours an aircraft of the search and rescue service in Trenton (province of Ontario) spotted the downed aircraft. They were able to save the lives of the wounded pilot and his two passengers, who were rushed to a hospital.

Another incident of this type took place on 29 September, involving another Canadian aircraft, which had also made a forced landing in a remote, rugged area of Canada. Again Cosmos-1383 helped rescue the pilot. The following day the satellite reported a downed aircraft in the state of New Mexico, in the United States. On 10 October a catamaran overturned in the Atlantic, 500 kilometers from the U.S. coast. Once again Cosmos-1383 came to the rescue. The U.S. Air Force Rescue Service Coordination Center at Scott Air Force Base in Illinois used signals from the Soviet satellite to direct a Coast Guard cutter to the site of the mishap. All crew members were rescued.

Just what is this satellite, which helped rescue 7 people in just a month's time? In the Western press it is called Cospas-1. Cospas is the space system of the Soviet part of an international ship and aircraft rescue program. The history of its development is as follows.

In 1976 the United States and Canada commenced a joint program to develop a rescue system dubbed Sarsat. France joined the program in 1977. During these same years the USSR was conducting its own development with the same objectives. Talks began in 1978 between delegations of the four countries, culminating with the signing of an agreement to establish the international Cospas-Sarsat system.

The system is to become fully operational in January 1984. It consists of two Soviet and three U.S. satellites equipped with special transceivers and eight



ground stations, with the USSR and United States operating three each, and Canada and France with one apiece. France is supplying Sargos transceiver-transponders. Their function is to relay to ground search and rescue service centers SOS signals transmitted by radio beacons of ships and aircraft at standard frequencies of 121.5 and 243 MHz, and the alternate frequency of 406 MHz. Canada will supply the locator beacons.

The system is to determine not only the coordinates of the location from which distress signals are emitted but also the nationality and type of vessel, aircraft registration number, time of the mishap, and provide information on the presence of fire (for a vessel). This is for the future. Presently Cosmos-1383, which was boosted into orbit on 30 June 1982, is taking part in equipment development experiments. Another Soviet search and rescue satellite, Cosmos-1447, was launched into orbit on 24 March 1983. The Americans put a similar satellite into orbit on 28 March. Now there will be even faster response to emergency signals.

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